- learning mathematics enjoyably and usefully since it has real applications in your practical life.
- We have introduced you the subject in a simple way to help building mathematical knowledge and the patterns of sagacious thinking as well.
- We have shown the important role of mathematics related to the other scientific knowledge.

## Mathematics 5

Fifth Primary

Student's Book

Second Term

الشروق
الحديثة للطباعة والتغليف

Arab Republic of Egypt
Ministry of Education
Book Sector


# Mathematics 5

Fifth Primary

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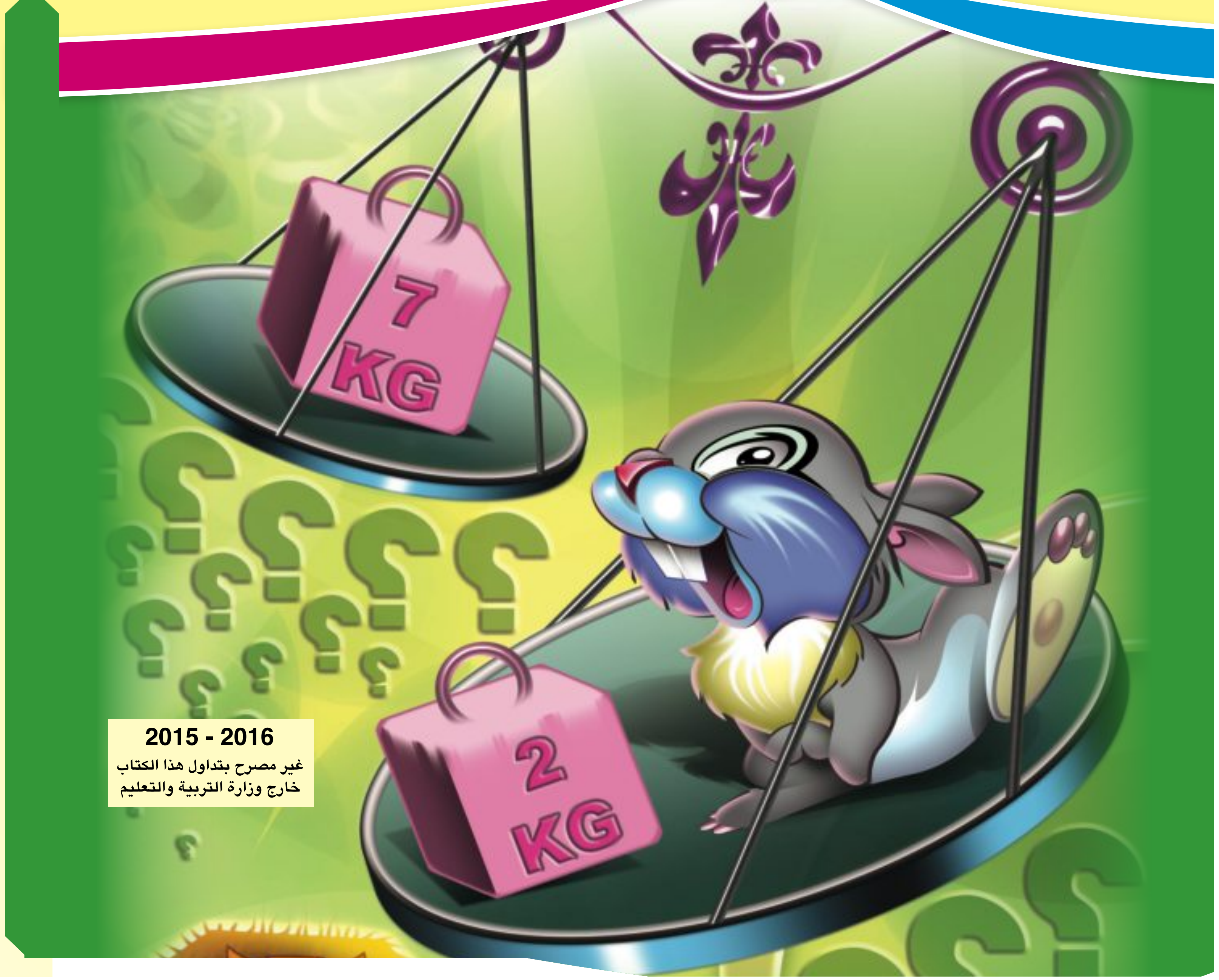



2015 - 2016
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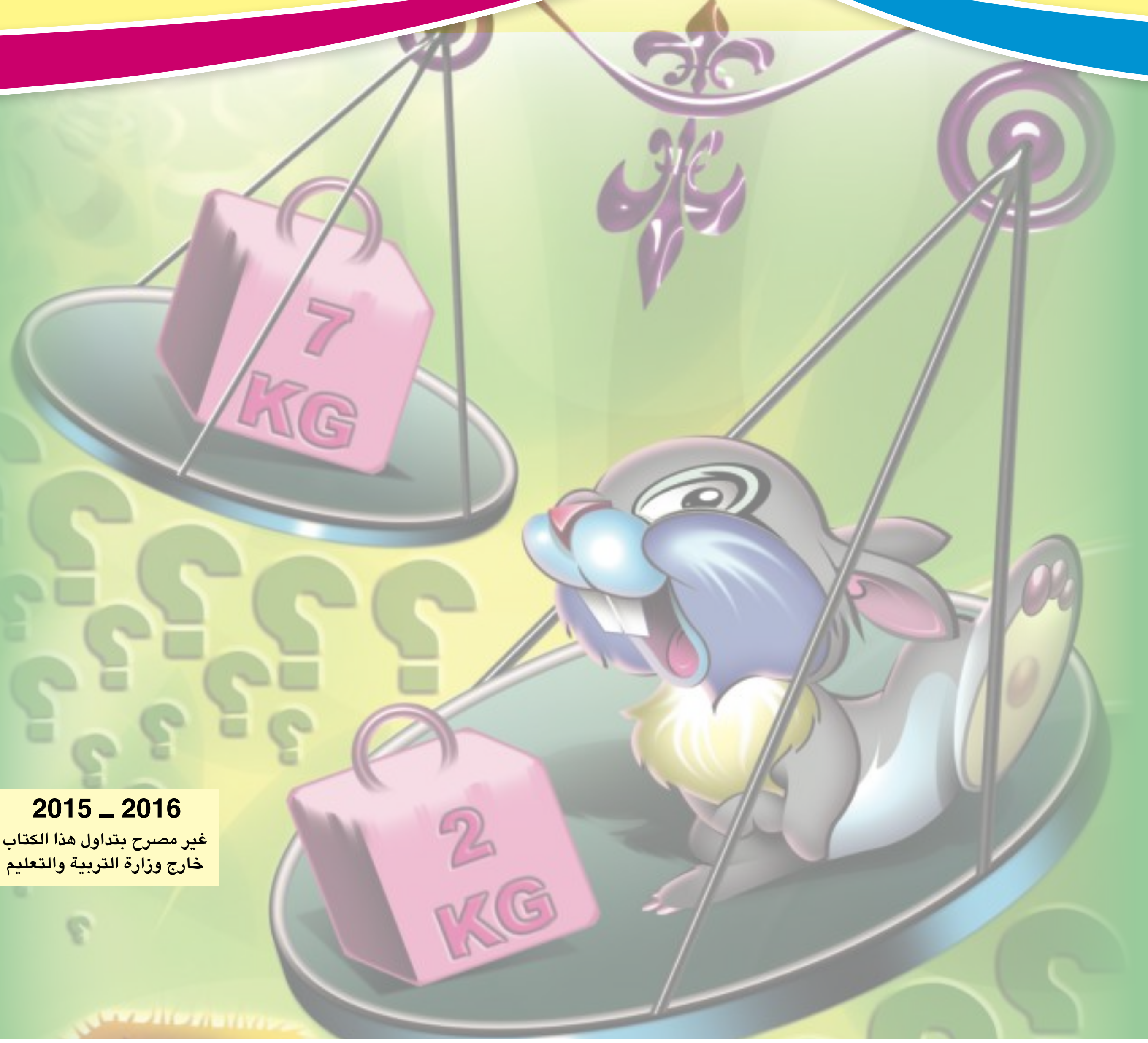
# Mathematics 5

## Fifth Primary

## Student's Book
## Second Term




2015 ـ 2016

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بسم الله الرحمن الرحيم

**Dear students:**

It is extremely great pleasure to introduce the mathematics book for fifth primary. We have been specially cautious to make learning mathematics enjoyable and useful since it has many practical applications in real life as well as in the other subjects. This gives you a chance to be aware of the importance of learning mathematics, to determine its value and to appreciate the mathematicians roles.

This book sheds new lights on the activities as a basic objective. Additionally, we have tried to introduce the subject simply and excitingly to help attaining mathematical knowledge as well as gaining the patterns of positive thinking skills which pave your way to creativity.

This book is divided into units, each unit contains lessons. Colors and pictures are effectively used to illustrate some mathematical concepts and the properties of figures. Lingual level of previous study has also been taken into consideration.

Our great interest here is to help you get the information by your self in order to develop your self-Learning skills.

Calculators and computer sets are used when there's a need for. Exercises, practices, general exams, activities, unit test, general tests, and final term tests attached with model answers have been included to help you review the curriculum completely.

Eventually, we hope getting on the right track for the benefits of our students as well as for our dearest Egypt hoping bright future to our dearest students.

**Authors**

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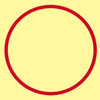
# List of Symbols

| | | | |
|---|---|---|---|
| **C** | Set of counting Numbers | $\leqslant$ | Less than or equal to |
| E | Set of Even numbers | = | Equal to |
| O | Set of Odd numbers | $\neq$ | Not Equal to |
| P | Set of prime numbers | | Open curve |
| $\varnothing$ or { } | Null set or empty set | | Closed Curve |
| $\in$ | Belonging |  | Circle |
| $\notin$ | Not belonging | $r$ | radius |
| $\subset$ | Inclusion | $\pi$ | Approximate ratio |
| $\not\subset$ | Not inclusion | $\overline{AB}$ | Line segment **A** B |
| $\cup$ | Union | $\overrightarrow{AB}$ | Ray **A** B |
| $\cap$ | Intersection | $\overleftrightarrow{AB}$ | Straight line **A** B |
| **U** | Universal set | $\angle$ | Angle |
| **X`** | Complement set | m ( $\angle$ B) | Measure angle (B), m ($\angle$ B) |
| **X-Y** | X difference Y | P (E) | Probability of event E P (E) |
| N | Set of natural numbers | $\equiv$ | Congruent |
| > | greater than | $\triangle$ | Triangle |
| $\geqslant$ | greater than or equal to | **(x, y)** | Ordered pair X, y (x, y) |
| < | Less than | | |

# Unit one

# 1

# Natural Numbers

# 1-1

# Set of Natural Numbers

**You will learn**

- Set of natural numbers

**Key Terms**

- Set of natural numbers (N)
- Infinite set

**Think and Discuss**

If you want to count your classmates, with which number will you start?

Counting starts with 1 then 2 , 3 and so on.

What is the meaning of your last number?

## Set of Counting Numbers

The set of counting numbers = {1, 2, 3, 4, ...} and it is an infinite set. Adding the element "0" to this set produces a new set denoted by N and called set of **natural numbers**, where : N = {0, 1, 2, 3, 4, ...}

> **N = {0, 1, 2, 3, 4, ....}**
> **It is an infinite set.**

**Example**

Complete using an appropriate notation of $\in$, $\notin$, $\subset$ and $\not\subset$ to get a true statement .

(A) zero ..... N
(B) 2222 ..... N
(C) 22.22 ..... N
(D) {2222} ..... N
(E) {2, 0.2} ..... N

**Solution:**

(A) $\in$
(B) $\in$
(C) $\notin$
(D) $\subset$
(E) $\not\subset$

**Think**

**Write down two sets, one of them is a subset of N and the other one is not a subset of N.**

## Exercises

**1** **Complete using an appropriate notation of ∈, ∉, ⊂ and ⊄ to get a true statement .**

A) 2 .......... N
B) {2} .......... N
C) $\frac{3}{4}$ .......... N
D) 0.7 .......... N
E) {55} .......... N
F) {2, 4, 6} .......... N
G) {1, 3} ∩ {2, 4} .......... N
H) zero .......... N

**2** **Complete :**

A) The smallest natural number is ..........
B) The smallest counting number is ..........
C) The set of natural numbers less than 5 is..........
D) Natural numbers ∩ Counting numbers (N ∩ C) = ..........

**3** **Match (✔) with true statements and (✘) with false statements.**

A) 7.2 ∈ N ( )
B) {0} ⊂ N ( )
C) {0} ∪ {1, 2, 3} = N ( )
D) {0, 1, 2} ∩ {0, 5, 10} = ∅ ( )
E) The greatest natural number is milliard. ( )
F) The set of natural numbers is infinite. ( )

# 1-2

# Some Subsets of N

**You will learn**

- Some subsets of N
- Set of even numbers
- Set of odd numbers
- Set of prime numbers.

**Key Terms**

- Subset.
- Set of even numbers (E).
- Set of odd numbers (O)
- Set of prime numbers (P)

## Think and Discuss

You have learned that the set of natural numbers

N = {0, 1, 2, 3, 4, ...}

The set of natural numbers N can be represented on the number line as follows:

| | |
|---|---|
| Set of natural numbers (N) | 0, 1, 2, 3, 4 |
| Set of even numbers (E) | 0, 2, 4 |
| Set of odd numbers (O) | 1, 3, 5 |
| Set of prime numbers (P) | 2, 3, 5 |

**From the references above you find that :**

Set of even numbers (E) = { 0, 2 , 4 , 6 , ..... }

Set of odd numbers (O) = { 1 , 3 , 5 , ..... }

Set of prime numbers (P) = { 2 , 3 , 5 , 7, ..... }

**Find :**

(A) E ∪ O (B) E ∩ O

(C) N ∩ P (D) E ∩ P

Whta do you observe?

## Think

**Draw a Venn diagram to represent the sets : N, O and E .**

**Example**

**Complete the following to get a true sentence:**

A) The set of natural numbers less than 5 is ........

B) N ∪ O = ........ where O is the set of odd numbers.

C) {15, 6, 0, 4} ∩ N = ........

D) E ∩ P = ........ where E is the set of even numbers and P the set of prime numbers.

E) E - O = ........

**Solution**

A) {0, 1, 2, 3, 4}  B) N  C) {15, 6, 0, 4}

D) {2}  E) E

## Exercises

**1** **Match (✔) with true statements and (✘) with false ones.**

A) Weight of anything in kgs ∈ N. (   )

B) Your cellphone number ∈ N. (   )

C) Number of pages of a book ∈ N. (   )

D) The smallest prime number is 1. (   )

**2** **Use the opposite Venn diagram to complete:**

A) X ∩ Y = ...

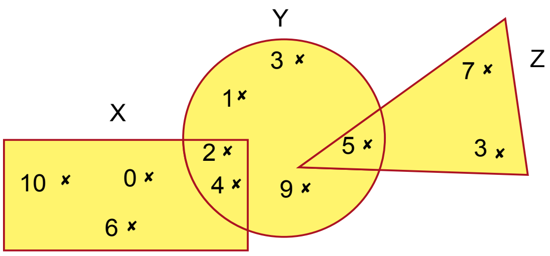
B) Y ∩ Z = ...

C) X ∪ Y = ...

D) (X ∪ Y) ∪ Z

E) (X ∩ Y) ∩ Z

F) X - Y



# 1-3 Ordering and Comparing Natural Numbers

**✱ You will learn ✱**

- ☺ To represent natural numbers N on the number line.
- ☺ To order and compare natural numbers.

**Key Terms**

- Ordering numbers
- Comparing numbers

**I: Representing natural numbers (N) on the number line.**

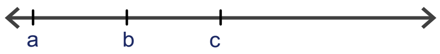
**Let's work together**

**Classmates have to work in pairs:**

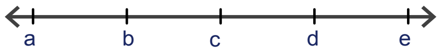
1. Draw a straight line.

2. Choose two points a and b on the line.

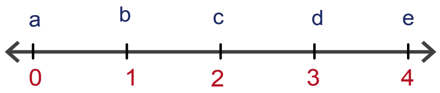
3. Determine the point c on the line, where ab = bc




4. Determine the points d, e, ... on the line , where ab = bc = cd = de.




5. Place the numbers 0, 1, 2, 3, 4, ... to correspond the points a, b, c, d, e, ....




**Remark**

**The natural number 3 is placed directly to the right of the number 2 and directly to the left of the number 4.**

**Complete:**

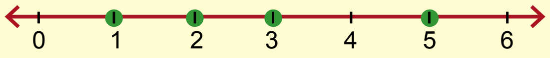
The number 2 is placed directly to the right of the number ......and directly to the left of the number ...... .

1-3

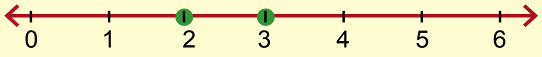
## Examples

**Represent the following sets on the number line :**

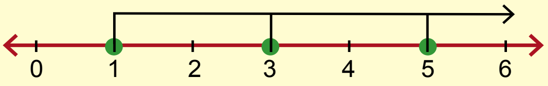
(A) X = {1, 2, 3, 5}




(B) Set of natural numbers between 1 and 4.




(C) Set of odd numbers.




## Practice

**Represent the following sets on the number line :**

(A) X = {0, 2, 3}.

(B) Set of even numbers.

## Think

Represent on the number line X ∪ Y , where: X = {1, 2, 3, 5} , Y = {5, 6, 7}

then find X ∩ Y

### II: Ordering and comparing natural numbers.

## Let's work together

**Work with your classmate.**

1. Draw a number line and place the numbers which represent the set of natural numbers on it.
2. **Complete:**

The number 2 is placed directly to the right of the number ..... ,Therefore 2 > ......,
While number 2 is placed directly to the left of the number ..... ,Therefore 2 < ......

The number 4 is placed directly to the right of the number .... and to the left of the number .........., Therefore 4 > ........, 4 < .........

# 1-3

## In general:

**For any two natural numbers represented on the number line a and b:**

☺ If the point that represents the number **b** is placed to the right of the point that represents the number **a** , then **b > a**

☺ If the point that represents the number **a** is placed to the left of the point that represents the number **b**, then **a < b**.

## Practice

**1** If the following natural numbers a, b, c, d and e are represented on a number line as shown on the figure below:

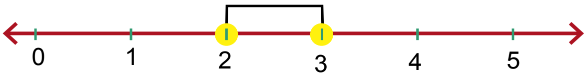
**I : Complete using > or < and justify your answer:**

- (A) a ◯ b because a is placed to the right of b.
- (B) b ◯ e because b is placed to the left of e.
- (C) c ◯ e because....................................
- (D) e ◯ b because....................................
- (E) a ◯ d because....................................
- (F) c ◯ d because ....................................

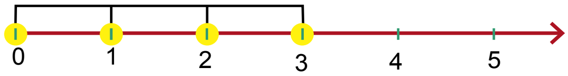
II : The ascending order is ...., ...., ...., ....,...., ....

**2** Represent on a number line.

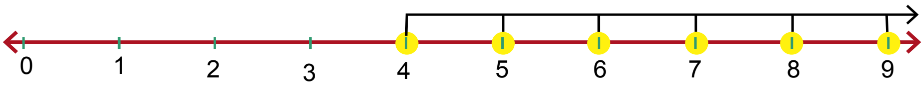
(A) The set of natural numbers between 1 and 4




(B) The set of natural numbers less than 4




(C) The set of natural numbers greater than or equal to 4, and written as $X \geqslant 4, X \in N$



## Exercises

**1** **Write the following sets using the listing method and represent them on a number line:**

X = {a : a ∈ N , where a is between 0, 4}

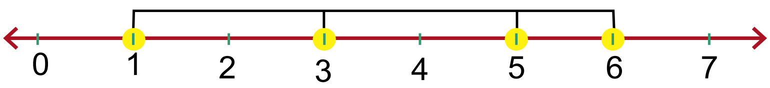
Y = {a : a ∈ N , a ⩾ 3}

Z = {a : a ∈ N , a < 6}

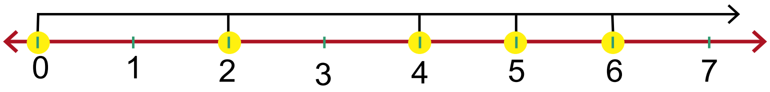
M = {a : a ∈ N , 2 ⩽ a ⩽ 5}

**2** **Write down the represented set on the following number lines:**

..............................




..............................




..............................

**3** **Find the ascending order of 5, 0, 2, 4, 1 and represent them on a number line.**

**4** Represent the following on a number line:

(A) The set of prime factors of 30.

(B) The set of prime numbers less than 25.

1-4

# Operations on Natural Numbers

**Think and Discuss**

**You will learn**

- ☺ Operations on natural numbers
- ☺ Addition operation in N
- ☺ Subtraction operation in N
- ☺ Multiplication operation in N
- ☺ Division operation in N

**Key Terms**

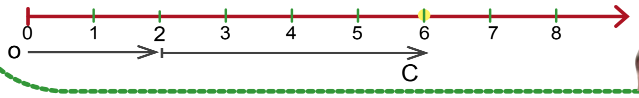
- Adding two natural numbers.
- Closure and commutative properties
- Associative property
- Additive neutral element
- Distribution property
- Subtraction in N
- Multiplicative neutral element

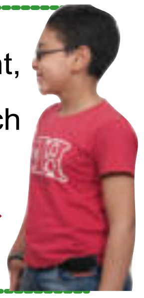
## I: Addition Operation in N

The teacher of Mohamed and Hoda asked them to think about a way to add two numbers such as 2 and 4 on the number line:

**Mohamed said**

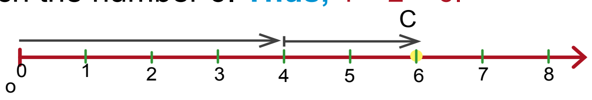
I will start at 0 moving two units to the right, then 4 units in the same direction, then I reach the number 6 . **Thus,** 2 + 4 = 6



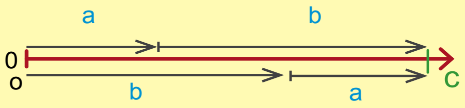



**Hoda said**

I will start at 0 moving first 4 units to the right, then two units in the same direction. Then I will reach the number 6. **Thus,** 4 + 2 = 6.



**i.e:** 2 + 4 = 4 + 2 = 6




**In general:** for any two natural numbers a and b : a + b = b + a

**Commutative** property of adding in N.

## Remarks

1 For any two natural numbers a and b:

$a + b = c$ , where $c \in N$ i.e. $2 + 3 = 5$ , $5 \in N$

**Closure property of adding in N.**

2 $(2 + 3) + 7 = 5 + ..... = 12$ , $2 + (3 + 7) = ..... + 10 = 12$

i.e. $(2 + 3) + 7 = 2 + (3 + 7) = 2 + 3 + 7 = 12$

**For any three natural numbers a, b and c:**

$$(a + b) + c = a + (b + c) = a + b + c$$

**Associatie property of adding in N.**

3 $6 + 0 = 6$ also $0 + 6 = 6$

i.e. $6 + 0 = 0 + 6 = 6$

**For any natural number a: $a + 0 = 0 + a = a$**

**Therefore: zero is the additive neutral element of adding in N.**

## Practice

**Complete to get a true sentence:**

A) $213 + 57 = 57 + ......$ ........... Property

B) $28 + (72 + 59) = (28 + ...) + 59 = ... + 59 = ...$ ........... Property

C) $0 + 4365 = ......$ ........... Property

(D) (999 + 487) + 1 = 999 + (....... + 1) ....... Property

= 999 + (1 + .......) ....... Property

= (999+1) + ....... ....... Property

= ....... + .......

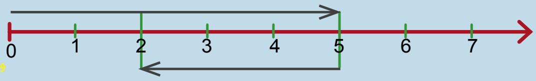
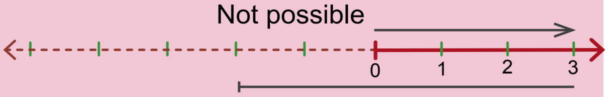
= .......

## II : Subtraction in N

**Subtract if possible:**

(A) 5 - 3

(B) 3 - 5

| To calculate 5 - 3 | To calculate 3 - 5 |
|---|---|
|  | Not possible  |
| 5 - 3 = 2 Possible | 3 - 5 Not possible |

**Remark**

☺ Subtraction operation is sometimes not possible in N.

☺ For any two natural numbers **a** and **b** then **a - b** is possible only if:

$$a \geqslant b$$

**Practice**

**Complete using ∈ or ∉**

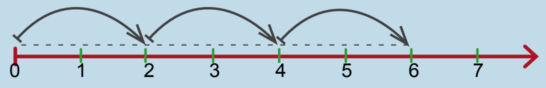
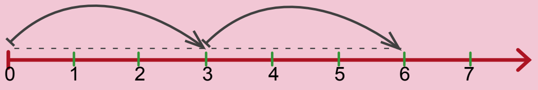
(A) (3 + 7) ....... N

(B) (45 - 35) ....... N

(C) (8 - 10) ....... N

(D) (28727 - 9543) ....... N

## III : Multiplication operation in N.

| To calculate $2 \times 3$ | To calculate $3 \times 2$ |
|---|---|
|   |   |
| $2 \times 3 = 6$ | $3 \times 2 = 6$ |

i.e. $2 \times 3 = 3 \times 2 = 6$

## In general:

For any two natural numbers a and b:

$$a \times b = b \times a$$

**Commutative property of multiplication in N**

### Remarks

1. For any two natural numbers a and b: $a \times b = c$ , $c \in N$

   i.e. the product of two natural numbers is a natural number.

   **i.e. closure property of multiplying in N.**

2. For $a \in N$ : $a \times 1 = 1 \times a = a$. **For example,** $5 \times 1 = 1 \times 5 = 5$

1 is called the multiplicative neutral element of multiplication in N.

3. $(2 \times 3) \times 5 = 6 \times 5 = 30$ , $2 \times (3 \times 5) = 2 \times ....$ =30

   i.e. $(2 \times 3) \times 5 = 2 \times (3 \times 5) = 2 \times 3 \times 5$

   **In general :** For any natural numbers a, b and c

   $$(a \times b) \times c = a \times (b \times c) = a \times b \times c$$

   **Associative property of multiplication in N.**

4. **If** $a \in N$**, then:** $a \times 0 = 0 \times a = 0$

5. $2 \times (4 + 7) = 2 \times 11 = 22$ , $2 \times 4 + 2 \times 7 = 8 + 14 = 22$

i.e. $2 \times (4 + 7) = 2 \times 4 + 2 \times 7$

**In general.** For any natural numbers a, b and c:

$$a \times (b + c) = a \times b + a \times c$$

also $$(a + b) \times c = a \times c + b \times c$$

Distributive property of multiplication over addition in N.

## Practice

**Complete :**

A) $5 \times (23 + 78) = 5 \times .....+ 5 \times ......$

$= ...... + ...... = ......$

B) $9 \times (24 + 17) = 9 \times ...... + 9 \times ......$

$= ...... + ......$

$= ............$

### IV: Division operation in N

$6 \div 2 = 3$ , $3 \in N$

While, $6 \div 5 = 1.2$ , $1.2 \notin N$

**i.e. Division operation is sometimes not possible in N**

**Also $0 \div 5 = 0$ , $0 \in N$ because $5 \times$ zero = zero**

**While $5 \div 0$ or $\frac{5}{0}$ is not possible because it is not defined. There is no number if multiplied by 0 produces 5.**

**Thus , dividing any natural number by zero is not possible.**

**Think**

**Three natural numbers a, b and c, where a = 12, b = 4 and c = 2:**

(A) Is a ÷ b equal to b ÷ a?

(B) Is a ÷ b = c , c ∈ N?

(C) Is (a ÷ b) ÷ c = a ÷ (b ÷ c)?

(D) Is c × (a ÷ b) = (c × a) ÷ (c × b)?

## Exercises

**1** **Complete and tell the property used:**

(A) (4 × 31) × 25 = (31 × ........) × 25 ........ Property

= 31 × (4 × ........) ........ Property

= 31 × ........ = ........

(B) 2 × (13 × 5) = 2 × ( 5 × ........) ........ Property

= (2 × ........) × 13 ........ Property

= ........ × 13 = ........

(C) 7 × (98 + 3) = ...... × ...... + ...... × ...... ........ Property

= ........ ........ Property

**2** **Use ∈ or ∉**

(A) $\frac{0}{7}$ ........ N

(B) (8 - 8) ........ N

(C) $\frac{3}{2-2}$ ........ N

(D) (7 × 3 - 3 × 7) ........ N

(E) (7 × 2 - 7 × 5) ........ N

(F) (0 × 9) ........ N

**3** **Complete to get a true sentence:**

A) The additive neutral element in N is ........ whereas the multiplicative neutral element in N is ....

B) If $9 \times 13 = 13 \times x$ then x = ........

C) (93 + 87) - (87 + 93) = ........

D) $7 \times 0 = \frac{....}{9}$ = ........

E) In the opposite figure: If m and n are two natural numbers, then ........ < ........

**4** **Complete using:**

(odd , even , prime , neither ).

A) An odd number + an even number = ...... number

B) The sum of two odd numbers = ...... number

C) An odd number × an even number =...... number

D) If x is an odd number , then x + 2 is ...... number

E) If x is an odd number , then x - 1 is ...... number

F) The smallest prime number × any prime number = ...... number.

**5** **Tell whether each statement is true or false:**

A) $(81 + 112) \times 117 = 117 \times (112 + 81)$ ( )

B) $(5 - 8) \in N$ ( )

C) $(28 \div 6) \in N$ ( )

D) 5 - 0 = 0 - 5 ( )

E) $(120 + 80) \times 4 = 120 \times 4 + 80 \times 4$ ( )

**6** **Calculate using commutative, associative and distributive properties. Check your answer using a calculator:**

A. $2 \times 347 \times 5$
B. $4 \times 128 \times 75$
C. $8 \times 49 \times 125$
D. $10\,(75 + 812 + 25)$
E. $(125 \times 8 + 25 \times 40) \times 90$

**7** **If a = 3 , b = 4 and c = 0, find the value of the following:**

A. $2 \times a + 5 \times b$
B. $a \times c + b \times c$
C. $(3 \times a + 5 \times b) \times c$
D. $(a + b - c) \times (a + b)$
E. $(b - a)\,(b + a)$

**8** **Let X be an even number between 3 and 8. Find the values of X then represent the values of $\frac{x}{2}$ on a number line.**

**9** **Write the results of the given expressions in an ascending order.**

$7 \times 10$ , $35 - 0$ , $178 - 178$ , $(2 \times 3) \times 5$

**10** **Complete the patterns :**

A. ........, ........., 8, 11, 14, ........., ........
B. ........., ........, 12, 24, 48, ........, ........

# 1-5 Numerical Patterns

**You will learn**

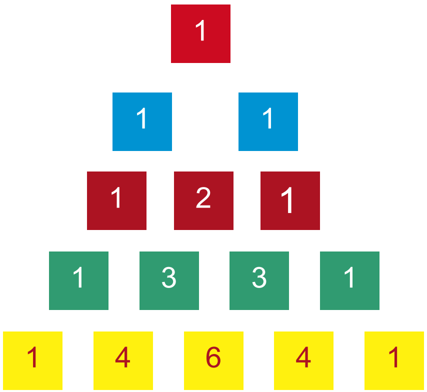
- To complete numerical patterns.
- To make numerical patterns.

**Key Terms**

- A pattern
- A numerical pattern

## Think and Discuss

In a math puzzle book, Hussam noticed an arithmetic triangle shown in the opposite figure. He and his friend Fayez thought to complete the pattern through row 7. Can you help them?



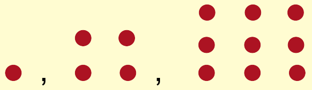

Pascal Triangle

## Example

Complete each of the following patterns:

(A) 5, 7, 9, 11, ........, ........

(B) 2 , 6 , 18 , 54 , ........, ........

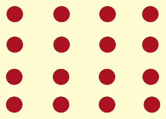
(C)  , ........

(D) $1 \times 1$ , $2 \times 2$ , $3 \times 3$ , $4 \times 4$ , ......., .......

### Solution

(A) Remark: we started with 5 and to get the successive number, 2 is added. Therefore, the next two numbers are 13 and 15.

(B) Remark: we started with 2 and to get the successive number, we multiply by 3. Therefore, the next two successive numbers are $54 \times 3 = 162$ and $162 \times 3 = 486$

(C) Remark: we started with one dot, then 4 and 9 dots. Therefore, the next successive number is as follows:  and consists of 16 dots.

(D) The next two successive numbers are $5 \times 5$ and $6 \times 6$.

## Practice

**1** **Complete using the same way:**

+ 2 + 2 + 2 + 2 + 2

1 , 3 , 5 , 7 , 9 , ..... , ..... , .....

(A) 3 , 33 , 333 , ..... , ..... , .....

(B) 2 , 4 , 8 , ..... , ..... , .....

(C) 1 , 4 , 7 , 10 , ..... , ..... , .....

(D) 1 , 4 , 8 , 13 , ..... , ..... , .....

**2** **Find the two successive numbers in each pattern:**

(A) 2 , 7 , 12 , 17 , ..... , .....

(B) 1 , 3 , 9 , 27 , ..... , .....

(C) 5 , 15 , 25 , 35 , ..... , .....

(D) 7 , 77 , 777 , 7777 , ..... , .....

# 1-5

## Exercises

**1** **Evaluate using a calculator . Write only 5 decimals without approximation.**

$\frac{1}{9} = 0.11111$

$\frac{2}{9} =$ ..............   $\frac{3}{9} =$ ..............

**Without using your calculator , can you evaluate:**

$\frac{4}{9} =$ ..............   $\frac{5}{9} =$ ..............   $\frac{6}{9} =$ ..............

$\frac{7}{9} =$ ..............   $\frac{8}{9} =$ ..............

**2** **Write down three successive numbers in each pattern:**

(A) 142, 143, 145, 148, 152, .........

(B) 299, 293, 288, 282, 277, ......

(C) 480, 492, 486, 498, 492, 504, .....

(D) 106, 100, 94, 88, 82, .........

(E) 89, 79, 70, 62, 55, .........

**3** Sherine sold a discount card that gives a discount to its owner at some fast food restaurants for LE 38. If the price of the card had increased LE4 annually during her owning to the card for 4 years. How much did she spend to buy this card?

**4** Hany has 3 test rabbits in his lab. If the number of rabbits is doubled each certain period . How many rabbits will be there in 5 periods?

# General Exercises

**1** **Find the sum using commutative and associative properties in N. State the property used:**

(A) 257 + 51 + 49
(B) 77 + 651 + 49
(C) 753 + 972 + 247
(D) 892 + 788 + 308 + 512
(E) 973 + 299 + 227 + 901

**2** **Complete the table, where a ∈ N and a is greater than 6 :**

| Number | the number just before | the number just after | the number with 5 less |
|---|---|---|---|
| a | .............................. | .............................. | .............................. |
| a + 6 | .............................. | .............................. | .............................. |
| a + 5 | .............................. | .............................. | .............................. |
| a + 9 | .............................. | .............................. | .............................. |

**3** **A man is X years old , where X ∈ N. Find :**

(A) his age after 8 years .
(B) his age 15 years ago.

**4** **Write < , > or = :**

(A) 908 .......... 9008
(B) 5075.......... 5057
(C) 2239 .......... 2229
(D) x + 18.......... x + 17 , where x ∈ N.
(E) x - 18 .......... x - 17, where x is a natural number greater than 20.
(F) x .......... 75 where x ∈ { 30, 21, 32, 33}.
(G) y .......... 18, where y ∈ {20, 21, 22, 23, 24}
(H) z .......... 35, where z ∈ {35}

**5** **Rewrite the following statements using $>$, $\geqslant$, $<$, or $\leqslant$:**

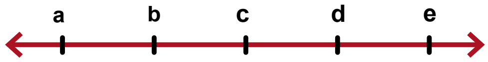
- (A) X is less than 8.
- (B) X is greater than 8.
- (C) 8 is less than X.
- (D) 8 is greater than 8.
- (E) Z is greater than or equal to L.
- (F) 9 is less than or equal to L.
- (G) 9 is greater than or equal to L.
- (H) Z is between 9 and 17.

**6** **Write the ascending order and the descending order of:**

- (A) 85, 78, 79, 67, 74, 86, 25
- (B) 453, 345, 435, 543, 354

**7** **In the opposite figure a, b, c, d and e are five natural numbers represented on a number line.**

Complete using $>$ or $<$ .




- (A) a ............. c
- (B) d ............. c
- (C) e............. b
- (D) e ............. c
- (E) c............. a
- (F) d............. a

**8** **Represent the following sets on a number line:**

- (A) X = the set of natural numbers less than 7.
- (B) Y = the set of natural numbers greater than 5.

**9** **a, b, c and d are four natural numbers where , d > a , b < c , c < d , b < d, and b > a. Represent these numbers on a number line.**

**10** **The greatest number of four consecutive natural numbers is x + 7, Find the other three numbers.**

**11** **The greatest number of five consecutive natural odd numbers is y +15. Find the other four numbers.**

**12** **The middle number of three successive natural odd numbers is y. Find the other two numbers. What is the least value of the number y?**

**13** **Evaluate:**

A) (16 + 24) ÷ 4 , (16 ÷ 4) + ( 24 ÷ 4). What do you notice?

B) 15 - 3 × 6 ÷ 2 + 1

C) 8 ÷ (8 - 2 × 3) + 3 × 2

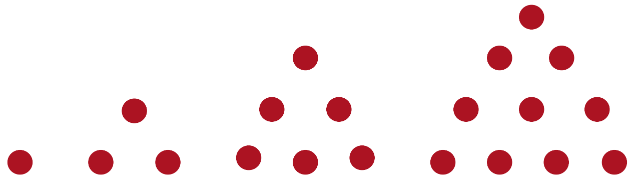
**14** **Find the following products using the distributive property:**

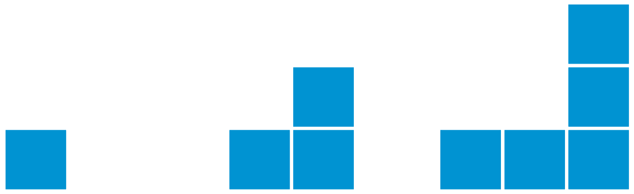
A) 572 × 99　　B) 915 × 1001　　C) 45 × 99

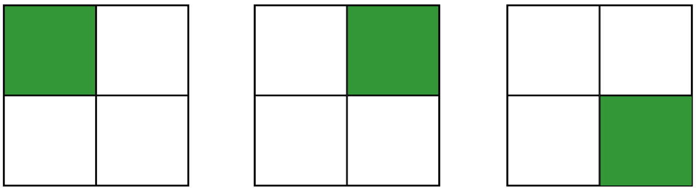
**15** Dina paid LE 34 for her annual membership card in a science club. Dina told her friend Hanaa that this amount is increased by LE11 annually. How much will it be after 10 years?

## Activity

**Notice each pattern then complete the next pattern:**

1.  .............

2.  .............

3.  .............

4. .............

Test

# Unit test

**1** **Choose the right answer:**

A) 75 + 89 = 89 + ........ (75, 100, 89)

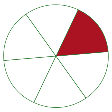
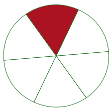
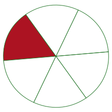
B) The smallest natural number is ........ $(0, \frac{1}{10}, 1)$

C) The next number in the pattern 5, 35, 65 is ........ (70, 95, 105)

**2** **Complete each pattern :**

A) 8, 16, 24, ........, ........

B) 100, 85, 70, ........ , ........

C)  ,  ,  , ........ , ........

D) 1 × 2 , 2 × 4 , 3 × 8 , ........, ........

**3** **Evaluate using commutative and distributive properties :**

A) 7 × 54

B) (12 + 98) × 18

C) 75 × (198 + 802)

D) 125 × 19 × 8

**4** **Complete to get a true sentence:**

A) 99 added to the neutral element of multiplication = ........

B) 2358 × 17 = 2358 × (7 + ........)

C) 75 × 99 = 75 ( ........ ........ ........)

= 75 × ........ 75 × ........

D) ........ + 354 = 354

# Unit two

# Equations

## 2

2-1

# Mathematical Expressions

You will learn

☺ Numerical expression

☺ Algebraic expression

Key Terms

- Numerical expression .
- Symbolic expression.

## Think and Discuss

### 1 Numerical expressions

3 + 5 = 8 , 7 - 2 = 5

3 × 7 = 21 , 21 ÷ 3 = 7

**All previous expressions are known as numerical expressions.**

### 2 Symbolic expressions

□ + 3 = 5      2 × ▭ = 10

△ - 4 = 15      $\frac{\bigcirc}{8} = \frac{3}{4}$

| The shape | | can be replaced by the symbol | |
|---|---|---|---|
| | □ | | X |
| | △ | | L |
| | ▭ | | Z |
| | ○ | | Y |

**and the expression can be written as:**

$X + 3 = 5$      $2 \times Z = 10$

$L - 4 = 15$      $\frac{Y}{8} = \frac{3}{4}$

**These expressions are known as symbolic expressions.**

**The following table summerizes it :**

| | Shape | symbol | Symbolic expression | Verbal expression (in words) |
|---|---|---|---|---|
| 1 | □ | X | X + 3 =5 | Which number can be added to 3 to have the sum 5 |
| 2 | △ | L | L - 4 = 15 | From which number 4 is subtracted to get 15 |
| 3 | ▭ | Z | 2 × Z = 10 or wirtten as 2Z = 10 | Which number can be multiplied by 2 to have the product 10, or what is the number which if doubled, the result is 10 |
| 4 | ○ | Y | $\frac{Y}{8} = \frac{3}{4}$ | what's the value of Y that makes the fraction $\frac{Y}{8}$ equivelent to the fraction $\frac{3}{4}$ |

**Remark** 2 × X is written as 2X , 5Y means 5 × Y

Also the double of X is wirrten as 2X. Also five times of Y is wirtten as 5Y

**Think**

**Complete using a suitable symbolic expression:**

A) Add 6 to the number X, the symbolic expression is ....................

B) Subtract 3 from the numbe Y, the symbolic expression is....................

C) Multiply 5 by the number Z, the symbolic expression is ....................

D) Divide the number M by 3, the symbolic expression is ....................

## Exercises

**1** **Complete the following table as the example:**

| | Number | Add 3 | Subtract 7 | Multiply by 3 | Divide by 4 |
|---|---|---|---|---|---|
| Example | x | x + 3 | x - 7 | 3x | $\frac{x}{4}$ |
| A | y | .................. | .................. | .................. | .................. |
| B | | .................. | z - 7 | .................. | .................. |
| C | | .................. | .................. | .................. | $\frac{L}{4}$ |

**2** **Complete the following table as the example:**

| | Verbal Expression (in words) | Symbolic Expression |
|---|---|---|
| Example | Add 3 to the double of the number x | 2 x + 3 |
| A | Subtract 5 from the double of the number y | ................................ |
| B | Add 7 to three times of the number z | ................................ |
| C | Subtract 3 from the half of the number x | $\frac{1}{2}$ x ........................ |
| D | Add 6 to one third of the number z | ................................ |

**3** **Complete:**

A. Saeed has LE X and his father gave him LE8. How much will Saeed have?

B. The length of a rectangle is 3cm more than its width. Let the length be l cm, then the width will be ....cm .

C The sum of what Manal and Nihal have is LE 10. If Manal has LE x, then Nihal will have LE..... .

**4 Choose a suitable symbolic expression:**

A If we subtract 5 from the number X we get ...... (5x , 5 - x , x - 5 , x + 5)

B Suzan saved LE x and her father gave her LE 10. She will have ... (x - 10 , x + 10 , 10 x , 10 -x)

C Subtracting 3 from double of the number x = ......(x - 3 , 2x -3 , 3x + 2 , 5x)

D The difference of two numbers is 7, and the smaller number is y, then the greater number will be = ...... (7y , 7-y , y-7 , y +7)

**5 Translate into symbolic expresions:**

A Subtract 8 from a number.

B Add 5 to the 3 times of a number.

C Add 4 to the half of a number.

D Subtract 7 from one third of a number.

**6 Complete:**

A The perimeter of a square whose side length is $\ell$ = ..............

B The perimeter of a rectangle is 20 cm. If its length is x cm , then its width = ..............

C The lengths of two adjacent sides of a parellelogram are x and y , then its perimeter =

D If the sum of two numbers is 10 and one of them is X, then the other = ..............

# 2-2 The Constant and the Variable

**You will learn**

- The meaning of a constant
- The meaning of a variable
- The meaning of a mathematical relation

**Key Terms**

- Constant
- Variable
- Mathematical Relation

**Think and Discuss**

**If the price of a pen is LE 2 complete:**

the price of 3 pens = 3 × 2 = LE 6

the price of 4 pens = 4 × ... = LE ... .

the price of 8 pens = 8 × ... = LE ... .

the price of 12 pens = .....×..... = LE... .

**Remark**

**In this example, the price of one pen is constant whereas the prices of pens vary according to variation in its number.**

Let x represent the number of pens

and y represent the price of the pens , then y depends on x, the price of x pens.

**y = 2 × x or y = 2 x.**

**Record the values of X and their corresponding values of Y in the following table:**

| x | 3 | 4 | 8 | 12 |
|---|---|---|---|---|
| y | 6 | ........ | ........ | ........ |

**Remark**

**The relation Y = 2X relates the two variables X and Y and is called a mathematical relation.**

## Practice

The price of a meal in a restaurant is LE 15, and LE 3 are added for delivery service, it does not matter, how many meals.

**How much should be paid in the following cases?**

A) 1 meal house delivery you pay LE........... .

B) 3 meals house delivery you pay LE ...........

.

D) 4 meals house delivery you pay LE ........... .

**Remark** **Total price = a meal price × the number of meals + delivery service**

Let y represent the total price you have to pay and x the number of meals you order, then the relation between y and x is as follows:

**y =** ........................................

**Remark** The number of meals is the variable and is denoted by X .

The total price is the variable and is denoted by Y .

The price of one meal is the constat.

and the price of delivery service is the constant .

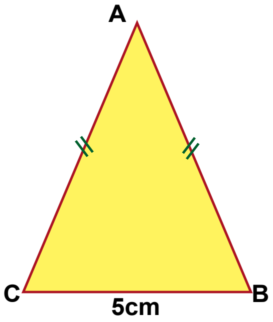
## Practice

1 An isosceles triangle with base 5cm. Find the mathematical relation between the lengths of its sides and its perimeter .
Let P represent the perimeter of the tringle ABC and L represent the length of $\overline{AB}$

then $\overline{AC}$ = ........

the perimeter of the triangle ABC = ...... + ...... + ......

**P = 2 L + 5 cm.**




**Remark**

**The lengths of $\overline{AB}$ and $\overline{AC}$ are variables , while the length of the base $\overline{BC}$ is constant and equals 5 cm.**

## Practice

**The owner of a factory pays the daily wage of one of his workers according to the mathematical relation Y = 12 + 5X**
**Where X represents number of working hours done in overtime and Y represesets the daily wage in LE .**

A **Complete:**

The constant daily wage = LE ....... .

The constant daily wage and overtime-wage = LE ....... .

B **Complete the following table that shows the mathematical relation of the daily wage according to the overtime hours:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Number of over time hours (x)** | 0 | 1 | 2 | ......... | ......... | 5 |
| **Total daily wage (y)** | ......... | ......... | ......... | 27 | 32 | ......... |

## Exercises

**1** **Choose the right answer:**

A. The side length of an equilateral triangle is L and its perimeter is P. The mathematical relation between P and L is : P = .....($\frac{1}{3}$ L , L + 3 , 3 L , L - 3)

B. The length side of a rhombus is x and its perimeter is P. The mathematical relation between P and X is : P = ........ (4x , x + 4 , x - 4 , x ÷ 4)

C. If the sum of two numbers x and y is 20 , then y = ........

(20 + x , 20 - x , x - 20 , $\frac{x}{20}$)

D. x and y are two numbers. The greater number is 3 more than the other. If the smaller number is y, then x = .... (3y , y - 3 , y + 3 , $\frac{1}{3}$ y)

**2** **If y = 4x is the mathematical relation between x and y, then complete the table:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **x** | 3 | 1 | 5 | ........ | ........ | ........ |
| **y** | ........ | ........ | ........ | 24 | 16 | 28 |

**3** Write down the mathematical relation between x and y , if the number x is 9 more than the double of y.

**4** Medhat bought x kg of chocolate and put it in a box that costs LE5. Calculate what Medhat should pay in terms of x if the price of 1 Kg of chocolate is LE 28.

# 2-3

# Equations

**Think and Discuss**

**You will learn**

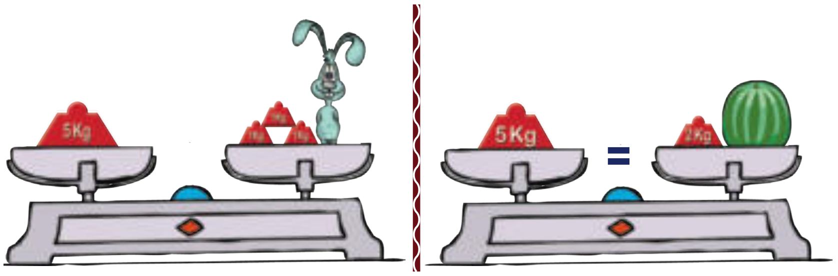
- The meaning of an equation
- To solve an equation

**Key Terms**

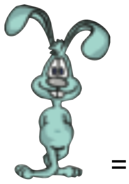
- Balance or equality
- Equation
- Solving an equation

## 1 The meaning of the equation

**Observe and look for the answer:**




**If the scale is balanced, then**

Weight of  = .........

Weight of = .........

If the weight of a rabbit is **x** kg, then the mathematical relation $x + 3 = 5$ describes the balanced situation of the scale, and this mathematical relation is called an equation.

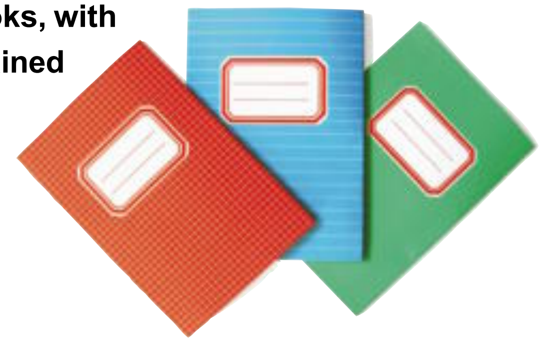
In the second case , if the watermelon weighs **y** kg , then the equation is $y + 2 = 5$ and is called an equation.

## Practice

**1** **Complete :**

| | Verbal expression | Symbolic expression |
|---|---|---|
| **Example** | **Adding 3 to a number produces 11** | **$x + 3 = 11$** |
| 1 | Adding 7 to a number produces 15 | ........................................ |
| **2** | Subtracting 2 from a number produces 33 | ........................................ |
| **3** | Adding 5 to the double of a number produces 17 | ........................................ |
| **4** | Subtracting 9 from the double of a number produces 23 | ........................................ |

**2** **Sohair saved LE 14. She bought 3 copybooks, with the price of LE X for each one and LE 8 remained with her.**



Choose a suitable equation for this situation

Ⓐ $14 + 3x = 8$ Ⓑ $8 - 3x = 14$

Ⓒ $3x + 8 = 14$ Ⓓ $3x - 14 = 8$

## Think

**1** **The equation $50 + x = 86$ may represent the following real world situation:**

The distance between two cities is 86 km. A car covered this distance in two stages, The first stage was 50 km and the rest was covered in the second stage. Tell another real life situation that can be represented by the same equation.

**2** **Write a real life situation for each equation:**

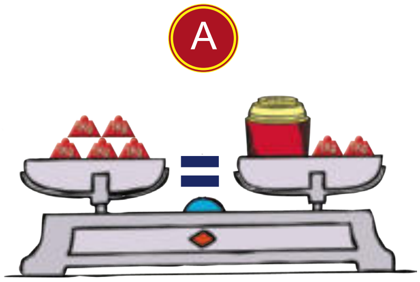
Ⓐ $x + 10 = 28$ Ⓑ $2y - 15 = 7$

Ⓒ $8 + 3y = 23$ Ⓓ $2x - 3 = 11$

## 2-3

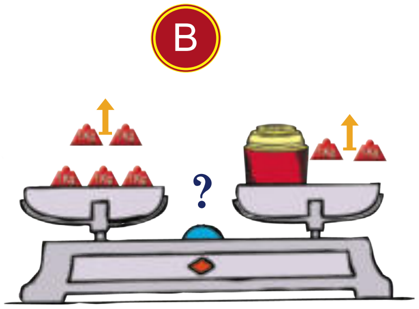
**Think**

**Examine the opposite figure and discuss it with your group.**




In figure (A) the scale is balanced.

☺ Take away two units from each pan as shown (in figure (B) ) Does the scale keep balanced?




☺ Add three units to each pan. Does the scale keep balanced? What do you deduce?

**Remark**

> **Adding (or subtracting) equal amounts to (or from) both sides does not affect on the equality of the equation.**

### 2 Solving Equations

**Example**

**Find the number which if added to 3, the sum is 9.**

**Remark**

**The variable is an unknown number (its value is unknown). Therefore, x is used to express it and the equation that describes this statment is :**

**$x + 3 = 9$**

**Now:** Can you solve this equation and find the value of the unknown x?
Solving an equation: It is to find the value of the unknown (symbol) included in the equation.

**Solution**

To solve **$x + 3 = 9$** we have to look for a number if added to **3,** the sum is 9
i.e.: $x + 3 = 9$ is the same as **: $6 + 3 = 9$ therefore, $x = 6$.**

**Another solution:**

x + 3 = 9 Subtracting 3 from each side as it doesn't affect the equality.

x + 3 - 3= 9 - 3

**Thus** : **x = 6**

## Practice

**Solve the equation x - 5 = 8**

(Add 5 to both sides ) 5 + x - 5 = 5 + 8 (because adding a constant number to both sides has no effect on the equation equality).

x + 5 - 5 = 5 + 8 (Commutative property).

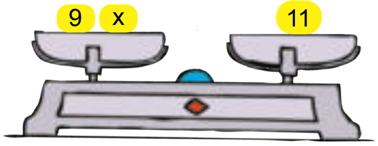
**So,** x + zero = ........ (Additive neutral element).

Thus: x = ........

## Exercises

**In each of the following figures, the two pans of the scale are balanced as in the first case:**

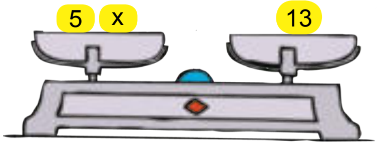
1




Equation: x + 9 = 11

Solution: x = 2

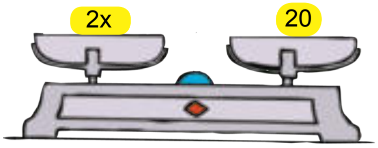
2




Equation: ...............

Solution: ................

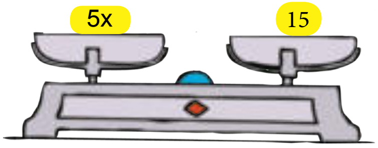
3




Equation: ...............

Solution: ...............

4




Equation: ...............

Solution: ...............

## 2-3

# General Exercises

**1** **Translate each verbal statement into an equation :**

- (A) A number if added to 17 the sum is 28.
- (B) If 9 is subtracted from a number, then the result is 23.
- (C) If 5 is subtracted from 3 times of a number , then the result is 16.

**2** **Write down a real-life situation that represents each of the following equations:**

- (A) $x + 7 = 29$
- (B) $x - 5 = 19$
- (C) $\frac{1}{3} y + 8 = 12$

**3** **Solve each equation:**

- (A) $x + 3 = 12$
- (B) $\frac{1}{2} x - 5 = 10$
- (C) $x - 7 = 25$
- (D) $y - 5 = 7$
- (E) $9 + y = 44$

**4** **Mental Math**

**(1) Find the value of X in the following:**

- (A) $22 + x = 9 + 22$
- (B) $35 + x = 18 + 35$
- (C) $7x = 117 \times 7$
- (D) $12 \times (17 \times x) = (12 \times 17) \times 32$
- (E) $3 \times 52 = (x \times 2) + (x \times 50)$
- (F) $(7 \times 9) + (x \times 5) = 7 \times 14$

**(2) Solve each of the following equations.**

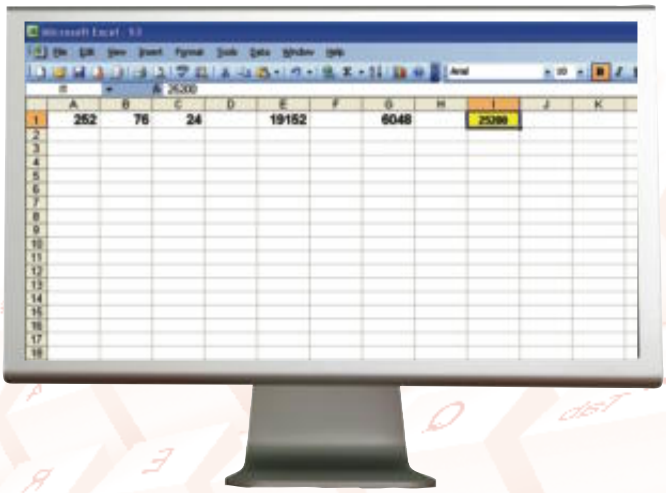
- (A) $24x = 61 \times 24$
- (B) $6 \times 14 = 6 \times (x + 5)$
- (C) $8 \times 45 = x (35 + 10)$
- (D) $(x + 2) \times 7 = 7 \times 8$
- (E) $573 = x + (7 \times 10) + (5 \times 100)$
- (F) $482 = (4 \times x) + (8 \times 10) + 2$
- (G) $42 = 2 + x \times 10$
- (H) $x \times 7 + x \times 50 = 2 \times 57$

# Technology

## Applications on natural numbers and equations using Excel-program:

**Practice:** **Evaluate : 252 × 76 + 252 × 24**

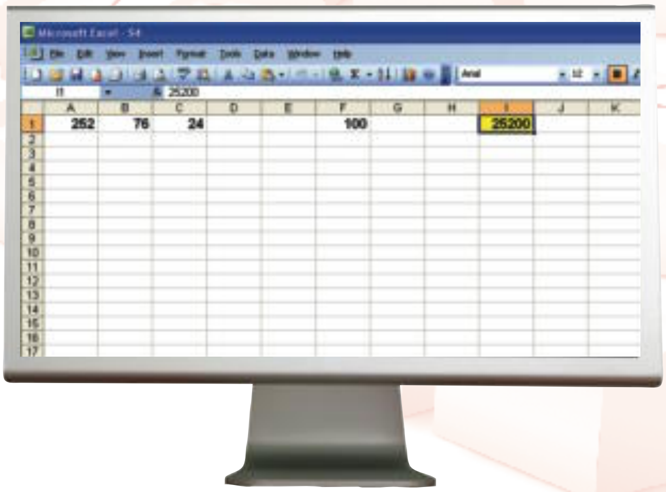
**To solve the problem: There are two possible ways to evaluate the numerical expression:**




**First way:** open your Excel program:

1. Enter the number 252 on cell $A_1$
2. Enter the number 76 on cell $B_1$
3. Enter the number 24 on cell $C_1$
4. Do a mouse click on $E_1$ and write down = then $A_1 \times B_1$ then press **Enter** the product of: 252 × 76 is 19152.
5. Repeat the same steps 1 - 4 : do a mouse click on $G_1$ and write down = then $A_1 \times C_1$, then press **Enter** the product of : 252 × 24 is 6048.
6. Do a mouse click on $I_1$ and write down = then $(E_1 + G_1)$, then press **Enter** the final result is 25200

**Second way:**




To evaluate **252(76 + 24)**

**Where:**

**[252 × 76 + 252 × 24 = 252 × (76 + 24)] (Give reason for your answer)**

**To solve the problem:** open excel program and repeat steps 1, 2, 3 mentioned previously.

4. Do a mouse click on cell $F_1$ then =, and write $B_1 + C_1$ then press **Enter** the sum of (76 + 24) is 100

5. Do a mouse click on $I_1$ and write = then $A_1 \times F_1$ then press **Entre** the final result is **25200**.

**Compare the results in these two ways and be sure of the equality.**

**Evaluate the following numerical expressions using Excel Program (in two different ways):**

**(1) 225 × 98 - 205 × 98**

**(2) 95 × 98 + 95 × 402**

**(3) 39 × 52 + 39 × 8 + 39 × 40**

**Solve for X: 2 X + 3 = 11**

**Solution:**

1. Open Excel program and enter the variable $x$ on cell $A_1$.
2. Do a mouse click on cell $A_2$ and enter the number 1, do a mouse click on cell $A_2$ and enter the number **2** and continue till you reach the last cell which is number 6 then leave the mouse.
3. Do a mouse click on cell $B_1$ and enter $3 + 2x$.
4. Do a mouse click under cell $B_1$ enter = then $2 \times A_2 + 3$ ($A_2$ represents the number 1) and then press **Enter** the result is 5.
5. Without doing any calculation, press on cell $B_2$ , a little square will appear on the left end. Do a mouse click on this square and drag it down till the end of the cell reached, where evaluations should be done, then leave the mouse.

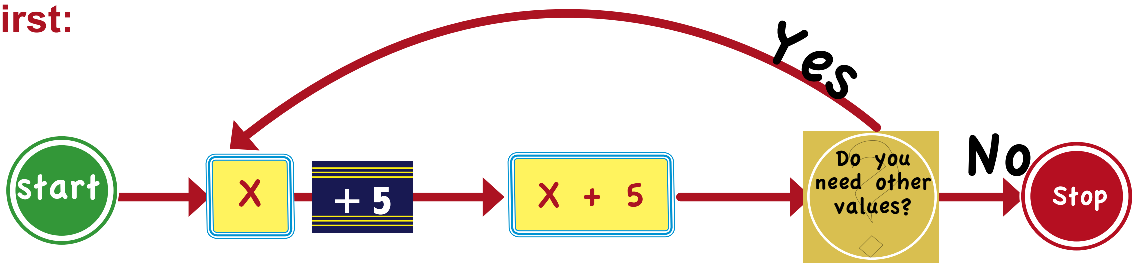
**The solution:** The number 11 highlighted on the cell $B_5$ satisfies the right side of the equation. Therefore, the solution of the equation. **2X + 3 = 11** is **X = 4**

**Use Excel program and solve for X: 2(3X + 4) = 38**

# Activity

Ahmed wants to innovate some exercises about numerical patterns to prepare puzzle games among school classes . He designed the following successive diagrams:

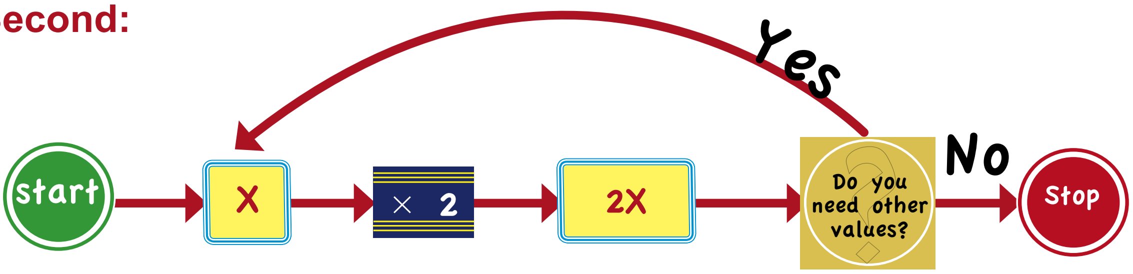
## First:




Choose any value for the variable X, let it be 7 and follow the instruuctions given in the shown pattern above. For instance : 7 + 5 = 12 to complete the pattern, enter 12, then add 5 to get 17 and so on.

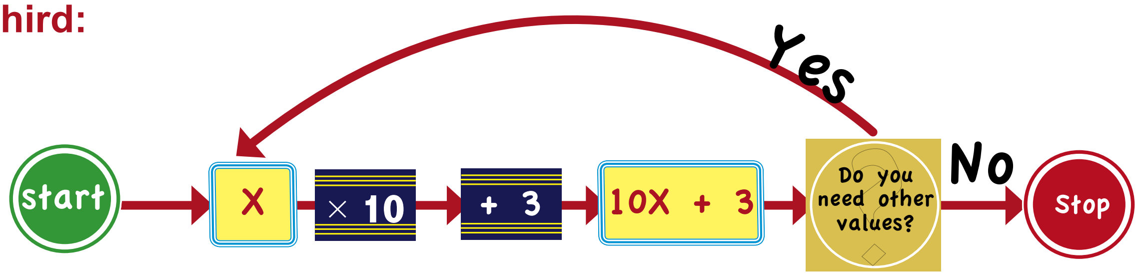
Complete : 7, 12, 17,........, ........

## Second:




Complete the pattern : 4, ........ , ........ , ........ , ........

## Third:




Complete the pattern : 3, ........ , ........ , ........ , ........

Can you help Ahmed design other new patterns? ......

# Test

## Unit test

**1** **Translate the verbal statments into symbolic expressions.**

A. 7 is added to the double of a number.

B. 3 is subtracted from three times of a number.

**2** **Complete:**

A. The perimeter of a square whose side length is x = .......

B. The perimeter of an equilateral triangle whose side length is l = .......

C. The area of a rectangle whose length is x cm and width is 5 cm = ....... $cm^2$

**3** **Solve the following equations:**

A. $x + 5 = 7$

B. $y - 3 = 9$

C. $3 + x = 11$

**4** **Write down a real life situation that can be represented by the equation $x + 5 = 12$, then solve for x.**

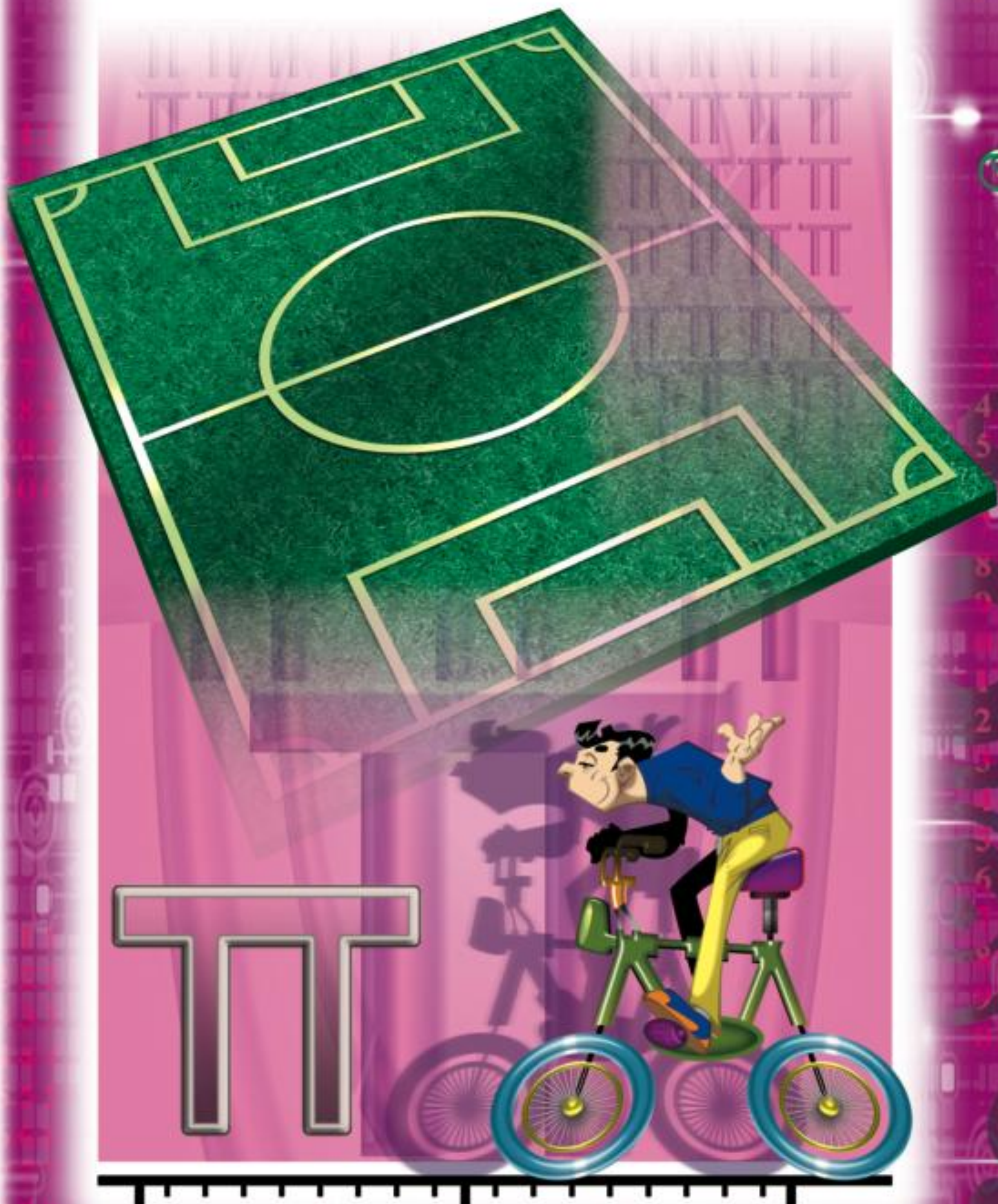
**5** **Solve for X:**

$75 = 5x + 7 \times 10$

# Unit three

# Measurement

3



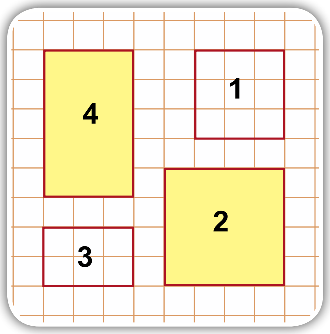
# 3-1

# Area and its Units

## Think and Discuss

You have studied before the area and perimeter of some geometric shapes. You know that the perimeter is the distance around a shape.

**Area of any surface = number of units needed to cover a flat surface.**




**Now** observe the opposite figure and calculate the number of square units which express the area of each shape and complete:

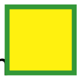
| Number and name of shape | Area in Square units |
|---|---|
| (1) Square | 9 |
| (2) .................... | .................... |
| (3) .................... | .................... |
| (4) .................... | .................... |

### Remember the area measuring units:

A) **1 Square cm** = $1 cm^2 = 100 mm^2$

this is the area of a square whose side length is 1 cm

1 cm



B) **1 Square meter** $(1 m^2) = 100 \times 100 = 10000 cm^2$

C) **1 Square kilometer** $(1 km^2) = 1000 \times 1000 = 1000\,000 m^2$

D) **1 Square decimeter =** $(1 dm^2) = 10 \times 10 = 100 cm^2$

**Area of any surface = Sum of areas of the parts forming this surface**

## You will learn

- Area measuring unit
- To find area of a surface
- To find area of a triangle

## Key Terms

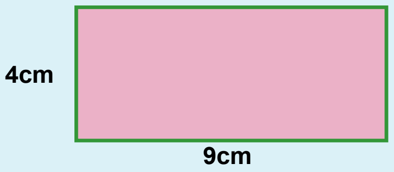
- Area
- Base
- Height
- Square centimeter
- Square meter
- Square kilometer
- Square decimeter
- Congruent surfaces

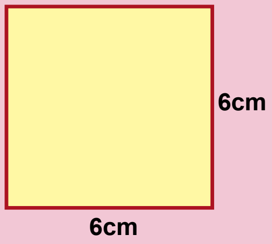
## Remember

Area of a rectangle = length × width.

Area of a square = side length × itself.

**Remark**




| area= $36cm^2$ | area= $36cm^2$ |
|---|---|

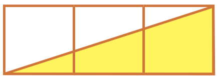
**The rectangle and the square are not congruent, but have the same area**

**Congruent shapes have the same surface area but the converse is not always true.**

## Areas of Triangles

### Let's work together.

Write the area of the colored part where ☐ represents $1cm^2$

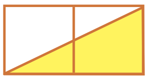


area of the rectangle = $3cm^2$

area of the colored triangle

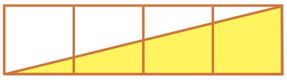
$= \frac{1}{2}$ area of the rectangle

$= \frac{1}{2} \times 3 = \frac{3}{2}$ $cm^2$



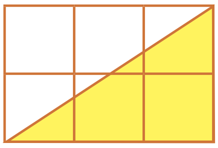
area of the rectangle = ...... $cm^2$

area of the colored triangle= ....$cm^2$



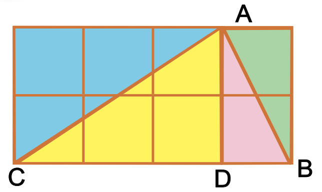
area of the rectangle = ...... $cm^2$

area of the colored triangle = ....$cm^2$



area of the rectangle = ...... $cm^2$

area of the colored trinagle = ....$cm^2$




Area of △ A B D = .....cm²

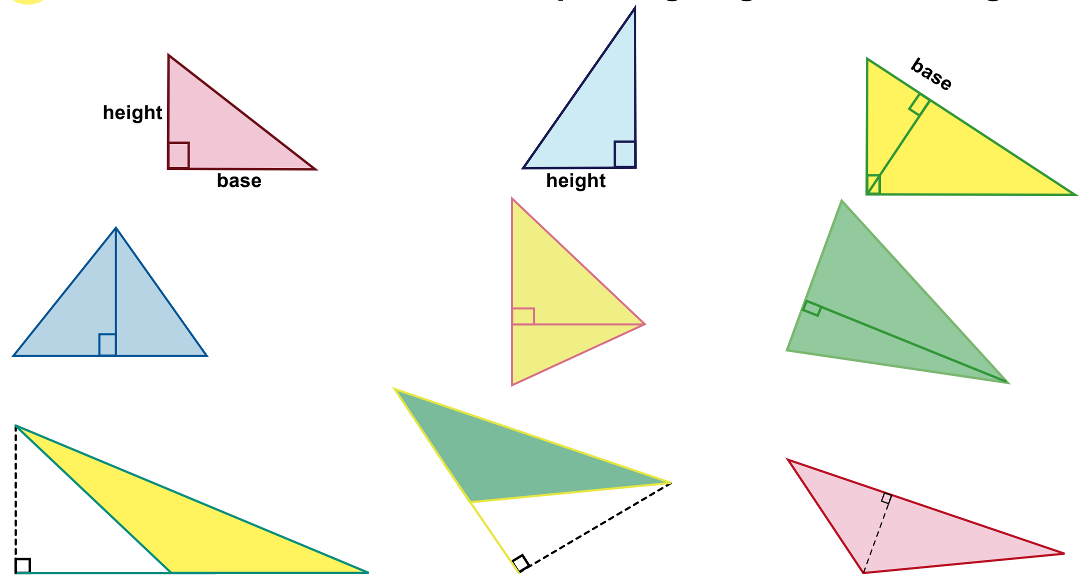
Area of △ A D C = .....cm²

Area of △ A B C = .....cm²

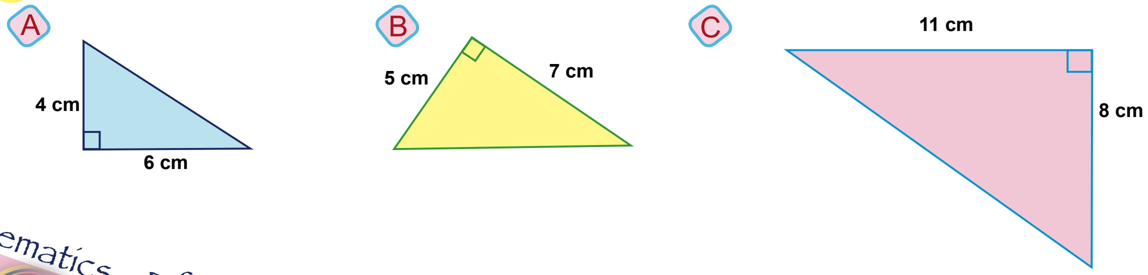
**Area of the triangle = $\frac{1}{2}$ the length of its base × its height**

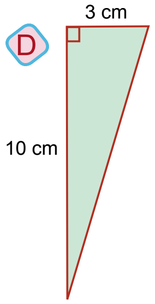
## Practice

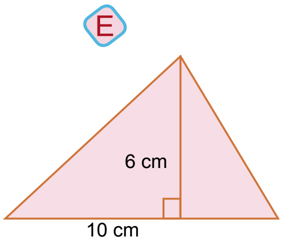
**1** **Determine the base and corresponding height in each triangle:**

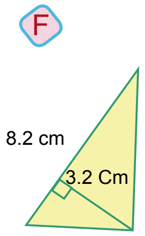


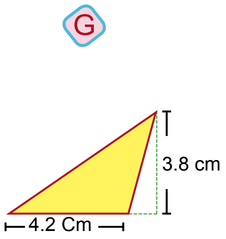

**2** **Find the area of each triangle:**





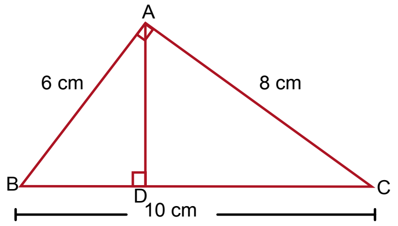




**3** **Complete the table:**

| Base length of △ (cm) | Height of △ in (cm) | Area of △ in (cm²) |
|---|---|---|
| 12 | 9 | ................................ |
| 10 | ................................ | 25 |
| ................................ | 8.2 | 24.6 |

**4** **In the opposite figure:**




A B C is a right angled triangle at A,

$\overline{AD} \perp \overline{BC}$. **Complete:**

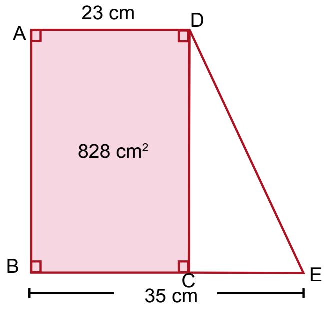
**The area of △ AB C** = $\frac{1}{2}$ × 8 × ...... = ......cm²

**also the area of △ A B C** = $\frac{1}{2}$ × 10 × A D = 5 × A D, then A D = ...... cm

## Practice

In the opposite figure, A B C D is a rectangle whose area is 828 cm²,

E ∈ $\overrightarrow{BC}$, A D = 23 cm and B E = 35 cm. Find the area of △ DCE




**Solution:**

The area of the rectangle A B C D = 23 × A B

828 = 23 × A B

A B = $\frac{........}{........}$ = .......cm

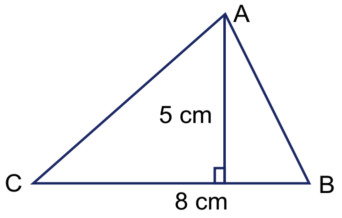
DC = .......cm, C E = 35 -.......=.......cm

The area of △ D C E = $\frac{1}{2}$ × ....... × ....... = .......cm²

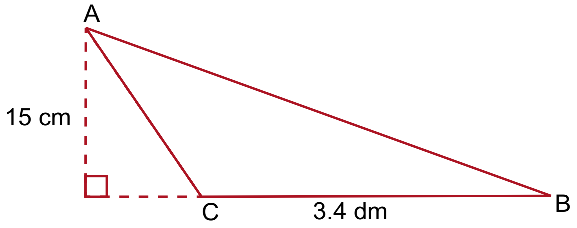
## Exercises

**1** **Find the area of △ A B C in each of the following:**

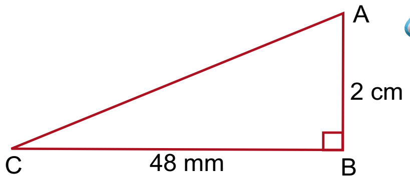
(A)



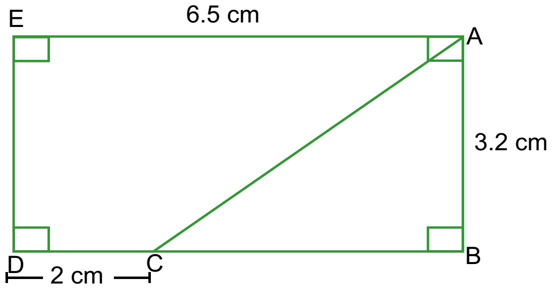

(B)




(C)

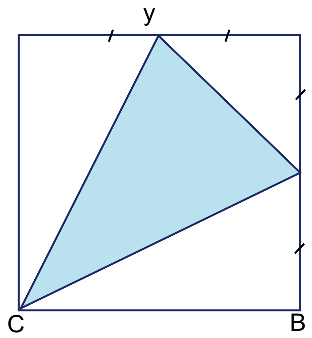



(D)




**2** **In the opposite figure:**

The side length of the square ABCD is 8 cm, X is the midpoint of $\overline{BA}$, Y is the midpoint of $\overline{DA}$. Find the area of the three non colored triangles, then conclude the area of △ XCY.

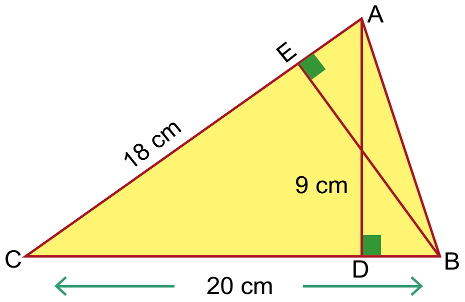



**3** Which area is greater: a triangle with base =3.25 dm and height = 4 dm or a rectangle with dimensions of 26 cm and 20 cm? Find the difference in $cm^2$.

**4** **In the opposite figure, find** :

(A) The area of △ A B C , where A D = 9cm, A C = 18cm, B C = 20cm

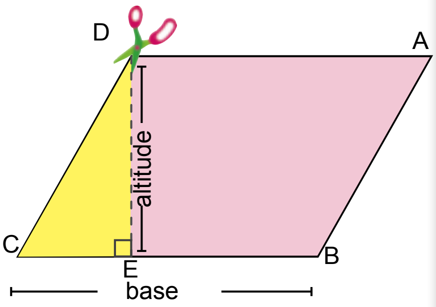
(B) The length of $\overline{BE}$



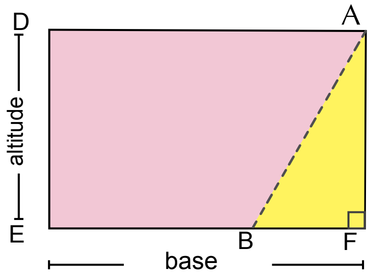
# 3-2

# Area of Parallelogram

Activity




1. Cut the parallelogram ABCD from a piece of paper in a way the parallelagram is congruent to the figure opposite. From its vertex D, draw an altitude to the opposite side $\overline{BC}$



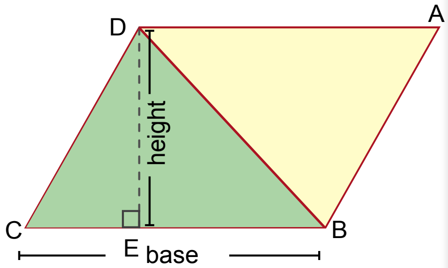

2. Separate the triangle DEC and place it in the position of the triangle AFB.

**What is the name of the formed figure AFED? Complete: the area of the parallelogram ABCD = The area of ...... .**

**Area of a parallelogram = base × height**

**Check:**

You know the diagonal of a parallelogram divides it into two congruent triangles.




Area of parallelogram =

$= 2 \times \frac{1}{2}$ base × height

**Area of a parallelogram = base × height**

**You will learn**

- To find the area of a parallelogram.

**Key Terms**

- Parallelogram
- Base of a parallelogram
- Height of a parallelogrm

# 3-2

**Remark**

An altitude of a parallelogram is a perpendicular line segment from a line containing the base to a line containing the side opposite the base. Any one of these sides is called a corresponding base.

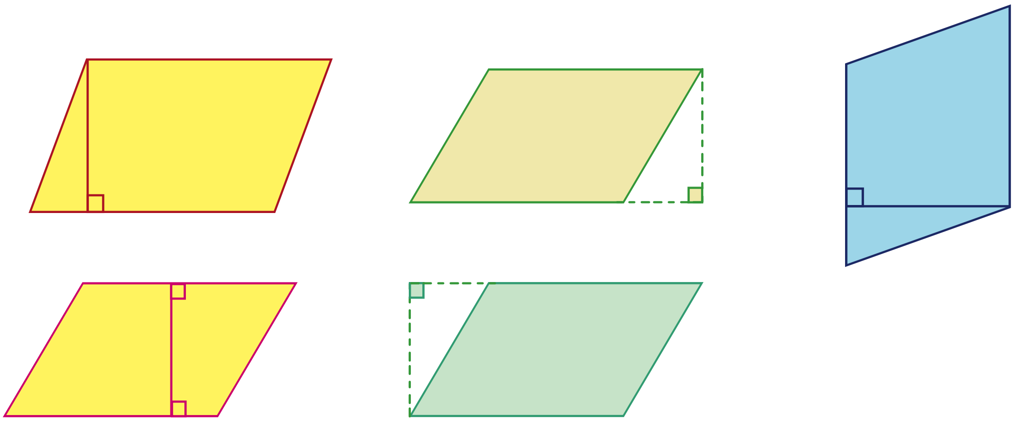
**Think**

How many altitudes are there in a parallelogram? .....................

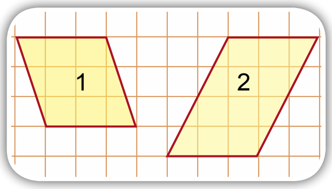
When do the altitudes equal in the parallelogram? .....................

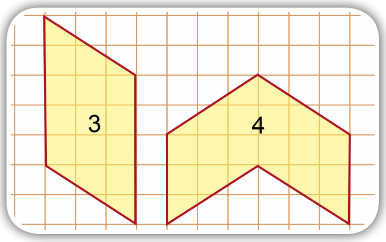
## Practice

**1** **In each figure of the following, determine the base of the parallelogram and its corresponding height.**



**2** **Complete to find the area of the colored figures:**




Area of figure 1 = ........ × ........ = ........ square units.

Area of figure 2 = ........ × ........ = ........ square units.

Area of figure 3 = ........ × ........ = ........ square units.

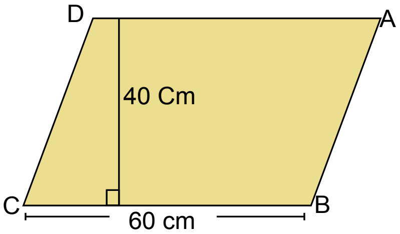
Area of figure 4 = ........ + ........ = ........ square units.

**3** Complete the table for parallelograms:

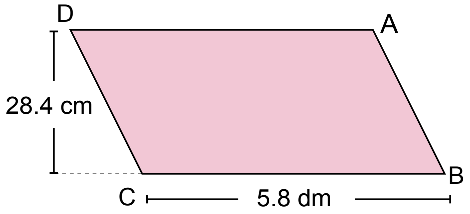
| Length of the base in cm | Height in cm | The area in $cm^2$ |
|---|---|---|
| 8 | 3.25 | ....... |
| 6.1 | ....... | 54.9 |
| ....... | 4.2 | 63 |

**4** Find the area of each parallelogram in each figure.

(A)




(B)

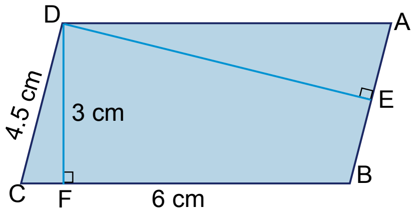



**5** In the opposite figure, complete:

Area of the parallelogram A B C D = B C × D F = ....$cm^2$

also , area of the parallelogram = .... × D E

deduce the length of $\overline{DE}$ .



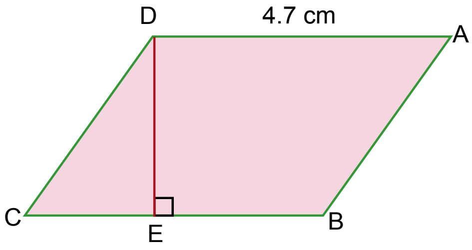

## Exercises

**1** Choose the correct answer :

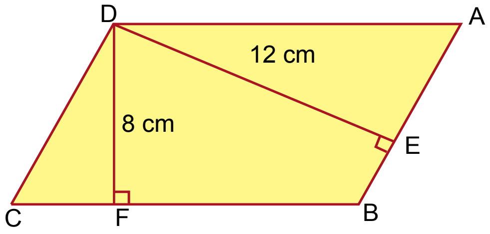
**In the opposite figure, the area of the parallelogram is:**

(A) 13.63 cm (B) 7.6 $cm^2$

(C) 13.63 $cm^2$ (D) 12.63 $cm^2$

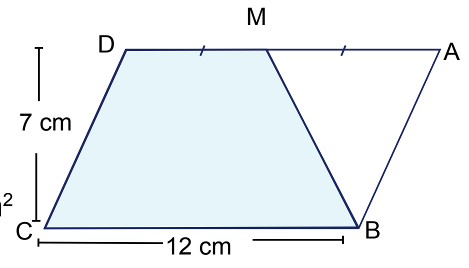



**2** **In the opposite figure,** A B C D is a parallelogram in which AB = 10cm, DE = 12cm, DF = 8cm. Find the area of he parallelogram ABCD, then find length of $\overline{BC}$ .



3. **In the opposite figure: Complete,** A B C D is a parallelogram where,

B C = 12 cm,




A D = ....cm

A M = ....cm

the area of the parallelogram A B C D = ....$cm^2$

the area of the triangle A B M = ....$cm^2$

the area of the figure M B C D = ....$cm^2$

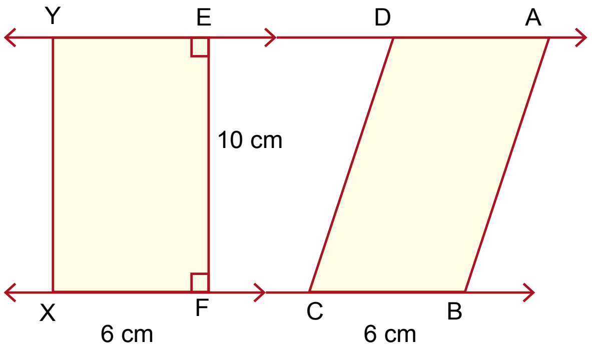
4. Find to the nearest hundredth, the area of a parallelogram whose base length is 34.7 cm and height 28.17 cm.

5. **Which area is greater**: the area of a parallelogram whose base length is 15.7 cm and height 9.4cm, or the area of a triangle whose base length is 14 cm and height 18 cm?

6. In the opposite figure, $\overleftrightarrow{AY} \parallel \overleftrightarrow{BX}$

A B C D is a parallelogram and EFXY is a rectangle.

Compare the area of the parallelogram and the area of the rectangle.

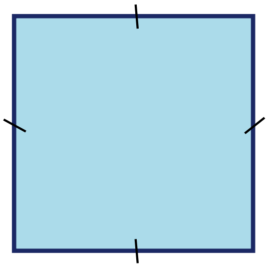



7. **Patterns:** Khaled drew parallelograms this way: the first with base length = 2cm and height = 2cm, the second with base length = 2cm and height = 4cm, the third with base length = 2cm and height = 8cm , and continued with this pattern. Find the area of the eighth parallelogram according to his pattern.

# 3-3

# Area of a square in terms of its diognal length

**Think and Discuss**



**You have learned before:**

the area of a square = side length × itself

**For example:** **to find the area of a square whose side length is 5 cm, then**

the area of the square = 5 × 5 = 25 $cm^2$

**Think**

Find the area of a square whose side length is 2.7cm?

**Now,** you will learn to find the area of a square in terms of its diagonal length.

**Area of a square = $\frac{1}{2}$ diagonal length × diagonal length**

**Remark**

**The lengths of the diagonals of a square are equal in length.**

**Example**

Find the area of a square whose diagonal length is 8 cm.

**Solution:**

Area of the square= $\frac{1}{2}$ diagonal length × digonal length

= $\frac{1}{2}$ × 8 × 8 = 32 $cm^2$

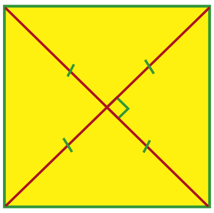
**You will learn**

- To find the area of a square in terms of its diagonal length.

**Key Terms**

- Diagonal of a square

**Remember**



The diagonals of a square are:

(1) Equal in length.

(2) Prependicular to each other.

(3) Bisecting each other.

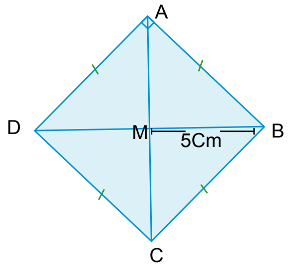
# 3-3

## Practice

1. **Find the area of a square whose diagonal lengh is 16 cm.**

2. **Complete:**

A

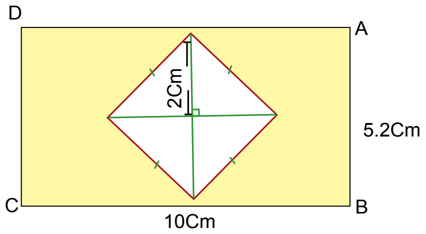



B M = 5 cm

the diagonal length $\overline{BD}$ = ..... cm

the area of the square ABCD = ..... cm$^2$

B




The area of the rectangle = ..... cm$^2$

the area of the square = ..... cm$^2$

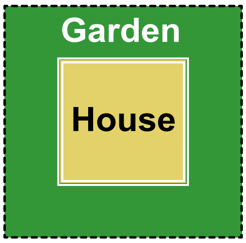
the area of the colored surface = ..... cm$^2$

## Exercises

1. The diagonal length of a square is 6cm. Find its area.

2. The area of a piece of paper is 312.5 cm$^2$ if 7 congruent squares with diagonal lengths of each 9 cm are cut off. Find the area of the left part of the paper.

3. A square shaped piece of land with diagonal length 28 m. A square shaped house with side length 15 m has been built on it and the left part was used as a garden . Find the area of the garden.



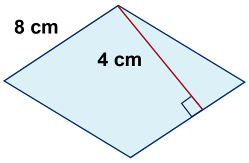
# 3-4

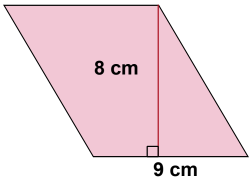
# The Area of a Rhombus in terms of its Diagonal lengths

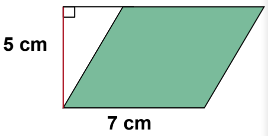
## Think and Discuss

**You have** learned before that a rhombus is a parallelogram. Therefore , to find its area, the same rule to find the area of a parallelogram is used .

**Find the area of each rhombus:**



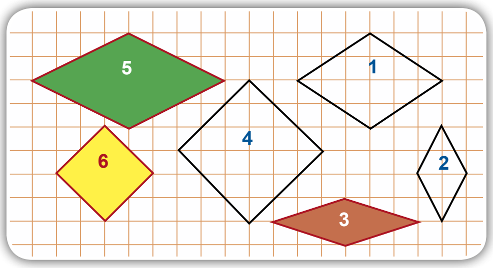

area = ... $cm^2$ area = ... $cm^2$ area = ... $cm^2$

**Now, you will learn to find the area of a rhombus in terms of its diagonal lengths.**

> **Area of a rhombus = $\frac{1}{2}$ the product of its diagonal lengths.**

## Practice

Observe the opposite figure and calculate the area of each rhombus in terms of its diagonal lengths. Figure (1) is given as an example.




| Figure number | Area in Square units | Figure number | Area in Square units |
|---|---|---|---|
| 1 | $\frac{1}{2} \times 4 \times 6 = 12$ | 4 | ........................ |
| 2 | ........................ | 5 | ........................ |
| 3 | ........................ | 6 | ........................ |

Shorouk Press

### You will learn

☺ To find the area of a rhombus in terms of its diagonal lengths.

### Key Terms

- Rhombus
- Diagonal of a rhombus

### Remember

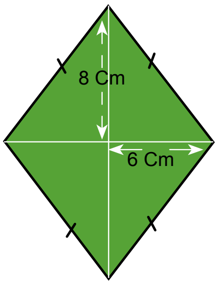
The diagonals of a rhombus are:
(1) Prependicular to each other
(2) Bisecting each other

## 3-4

# Exercises

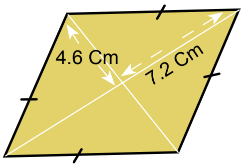
**1** **Find the area of each figure:**

A



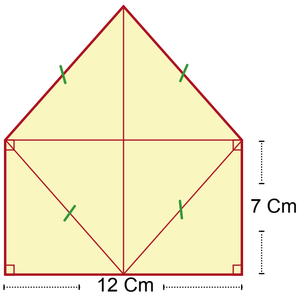

area = .... cm²

B




area = .... cm²

C




area = ... cm²

**2** **Complete the following table:**

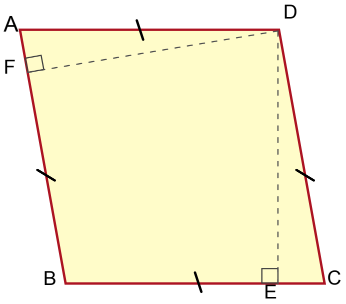
| Diagonal length of rhombus | The other digonal length of rhombus | Area of rhombus in square units |
|---|---|---|
| 3 cm | 5.4 cm | ...... $cm^2$ |
| 2.3 cm | ...... cm | 4.6 $cm^2$ |
| 24 mm | 3 cm | ...... $mm^2$ |
| 27 cm | ...... dm | 8.1 $dm^2$ |
| 1.7 m | ......cm | 3.4$m^2$ |

**3** **In the opposite figure, find:**

**a)** The area of the rhombus ABCD, whose side length is 10 cm and diagonal lengths are 16 cm and 12 cm.

**b)** The length of. $\overline{DE}$ , and $\overline{DF}$.

What can you say about the heights of rhombus?




**4** **Find the area of a rhombus with diagonal lengths 7 cm and 9 cm and if its height is 5 cm. Find its side length.**

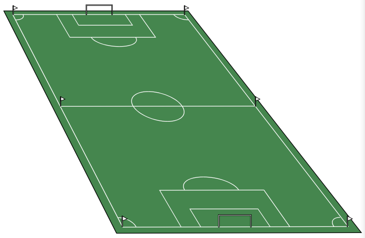
# 3-5

# Circumference of a Circle

**Activity 1**

**Find using a measuring tape:**

1. The length of the curved line that represents a circle located at the middle of a footaball playground. The length of this curved line is called the circumference of the circle.

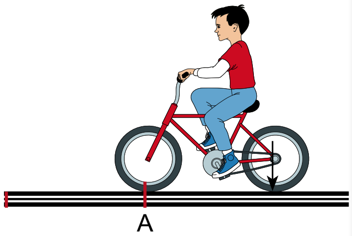


**Circumference of the circle = .....**

2. Measure the length of the diameter of this circle. Diameter length = .....

3. Find $\frac{\text{cirumference of the circle}}{\text{diameter length of th circle}}$ = ............

**Activity 2**




Ahmed made a sign on the front wheel of his bicycle, where it touches the earth. He labeled the touch point A on the earth. Then he rode his bicycle in a straight line till the sign touched the earth again and labeled it B on the earth. He recorded the following data:

**Circumference of the wheel = the length of** $\overline{AB}$ **=** .....

**Diameter length of the wheel =** .....

Find $\frac{\text{cirumference of the circle}}{\text{diameter length of th circle}} = \frac{......}{......}$ = ..........

**You will learn**

- To find the circumference of a circle.
- What is the approximate ratio $\pi$?

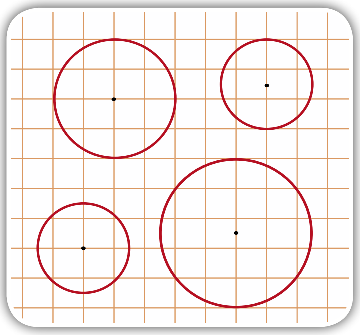
**Key Terms**

- Circumference of a circler
- The approximate ratio $\pi$.

# 3-5

**Activity 3**

Use a compasses to draw some circles with different radii as shown in the opposite figure. Find the cirumference of each circle using a fine thread.



**Record the results in a table like the following one:**

| Diameter length | Circumference | $\frac{\text{circumference}}{\text{diameter length}}$ |
|---|---|---|
| ............... | ............... | ............... |
| ............... | ............... | ............... |
| ............... | ............... | ............... |
| ............... | ............... | ............... |

Use a calculator to do the division operation. What do you notice?

**From activities 1, 2 and 3 we observe that:**

$\frac{\text{circumference}}{\text{diameter length}}$ **has nearly the same value and approximately equal to 3.14** or $\frac{22}{7}$ and known as approximate ratio $\pi$ and pronounced "pie" .

Mathematician Ghiatho Al-dein Alkashi, 1380 - 1436 B.C, calculated an approximate value for this ratio.

**i.e. :** $\frac{\text{circumference of a circle}}{\text{diameter length of the circle}} = \pi$

**The circumference of a circle = $\pi \times$ diameter length**

**Where $\pi \approx 3.14$ or $\frac{22}{7}$**

**Example**

Find the circumference of a circle with diameter length 14 cm.

**Solution:**

The circumference of a circle = $\pi \times$ diameter length

$= \frac{22}{7} \times 14 = 44$ Cm

## Practice

**Complete the table :**

| Radius length | Diameter length | π | Circumference |
|---|---|---|---|
| 7 cm | ...cm | $\frac{22}{7}$ | ......cm |
| ...... cm | 20 cm | 3.14 | ...... |
| ......cm | ......cm | 3.14 | 75.36 cm |
| mm | 98 mm | $\frac{22}{7}$ | mm |

## Think

1. Find the circumference of the following circles whose radii lengths are: ($\pi = \frac{22}{7}$) for each.

   **a)** 48 cm **b)** 14 cm **c)** $10\frac{1}{2}$ cm **d)** 3.5 cm

2. Find the circumference of the following circles whose diameters lengths are: ($\pi$ = 3.14) for each.

   **a)** 10 cm **b)** 100 cm **c)** 50 cm

3. Find the radii lengths of the following circles whose circumference are: ($\pi = \frac{22}{7}$) for each.

   **a)** 88 cm **b)** 11 cm **c)** 66 cm

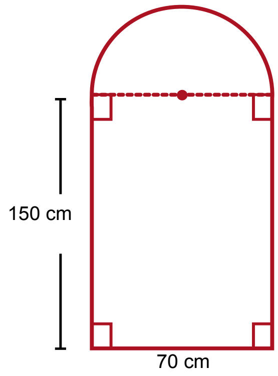
4. Two circles in which the diameter length of the first one is 20 cm and 40 cm for the other. Find the difference between their circumferences. ($\pi$ = 3.14)

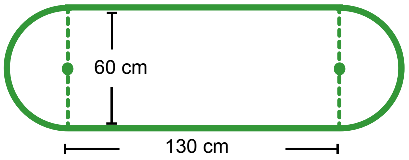
5. If the wheel's diameter length is 66 cm. What is the distance that the bike covers if the wheels turns 1000 rounds. ($\pi$ = 3.14)

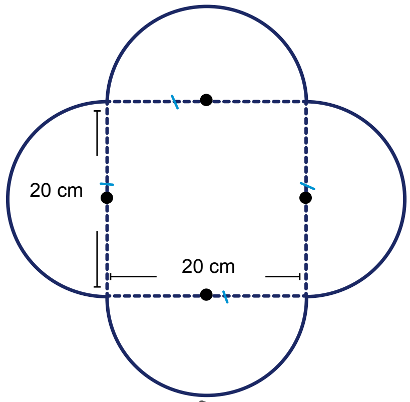
## General Exercises

1. Calculate the circumference of a circle whose diameter length is 15.4 cm to the nearest hundredth (where $\pi$ = 3.14)

2. Calculate the perimeter of each of the following figures , where ($\pi \approx$ = 3.14)



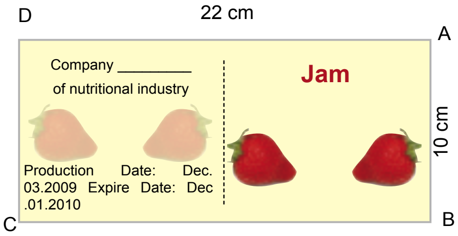




3. A wheel of a bicycle has a diameter length 56cm . Find the covered distance when completing one turn. How many turns should be done to cover a distance of 352 m?

4. A jam jar has the form of a cylinder. Its flat base is a circle with diameter length 3.5cm. Find the circumference of its flat base.

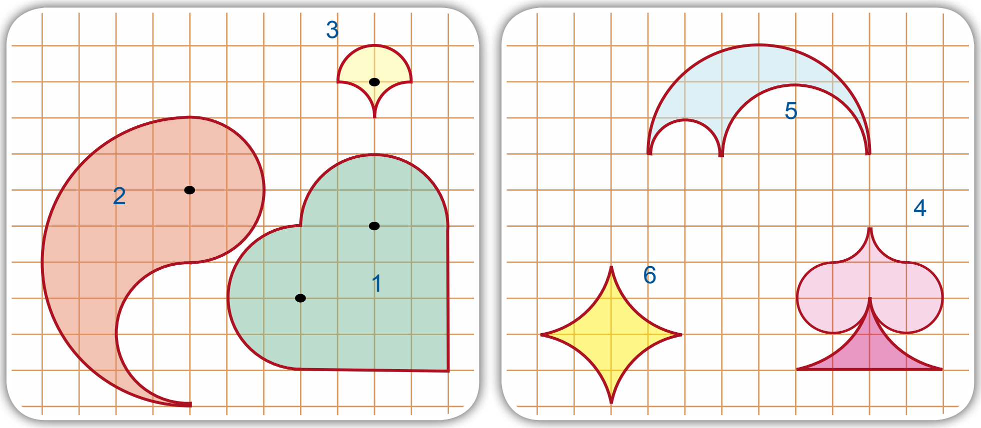
5. A piece of paper has the form of a rectangle with dimensions 10 cm and 22 cm is sticked down on the curved surface of the jam jar, where $\overline{AB}$ coincides on $\overline{DC}$ .The height of the jam jar = ......cm
The circumference of the flat base = .......cm
Find the radius length of the flat base where ($\pi = \frac{22}{7}$)




6. Which figure has greater area; a parallelogram whose base length is 5.4 cm and its corresponding height is 4.1 cm, or a rhombus with diagonal lengths 5.4 cm and 4.1cm?

# Activity

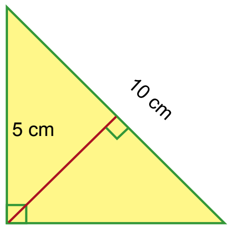
**Calculate the perimeter of each of the following figures, where $\pi \approx 3.14$:**

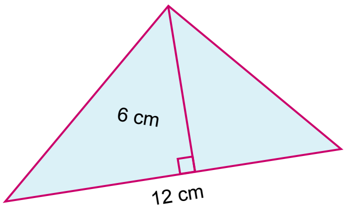


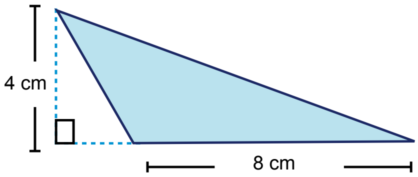

| Figure | Perimeter |
|---|---|
| 1 | ..................................... |
| 2 | ..................................... |
| 3 | ..................................... |
| 4 | ..................................... |
| 5 | ..................................... |
| 6 | ..................................... |

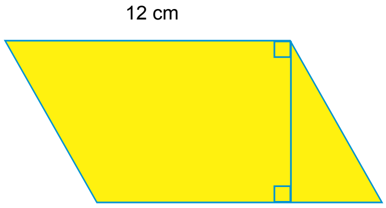
# Unit Test

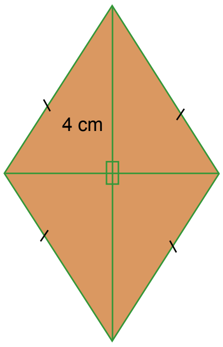
**1** **Find the area of the following figures :**

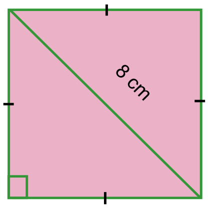



**2** **If** the area of a parallelogram with base length 12 cm and its corresponding height of 6cm is equal to the area of a rhombus with a diagonl length 10 cm, then find the length of the other diagonal of the rhombus.

**3** Find the circumference of a circle with diameter length 14 cm $(\pi = \frac{22}{7})$

**4** A piece of land has the shape of a parallelogram whose base length is 18m and its coresponding height 10m. A flower basin has the shape of a square whose diagonal length is 7m is placed inside it. Find the area of the surface left .

**5** **If** the circumference of a circle is 154 cm, then find its diameter length $(\pi = \frac{22}{7})$

# Unit Four

# 4

## Geometric transformations

4-1

# Symmetrical figures and axis of symmetry

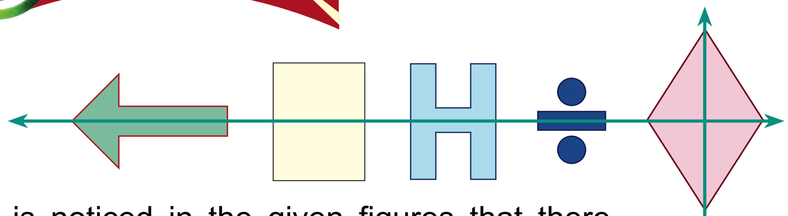
**You will learn**

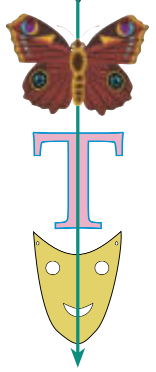
- Symmetrical figures and axis of symmetry.
- The meaning of reflection.
- To find the image of a point by reflection across a line.
- To find the image of a straight segment by reflection across a line.
- To find the image of a geometric figure by reflection across a straight line.

**Key - Terms**

- Geometric transformation
- Symmetrical figures
- Reflection
- Axis of symmetry

## Think and Discuss



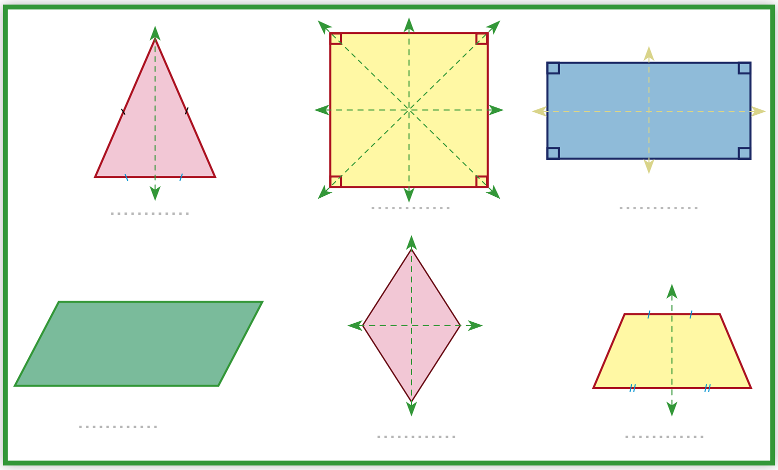


It is noticed in the given figures that there is a straight line dividing each figure into two identical parts.

This line is known as the axis of symmetry of the figure.

If the paper is folded on the axis of symmetry, the two halves will coincide on each other.

The following figure illustrates the symmetry axes of some figures you learned before. Write the name of each figure and complete:

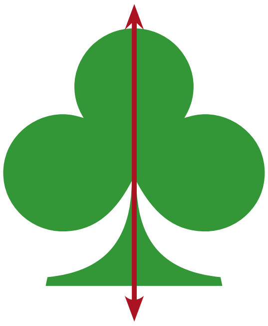


Ⓐ Figures having axes of symmetry are ......

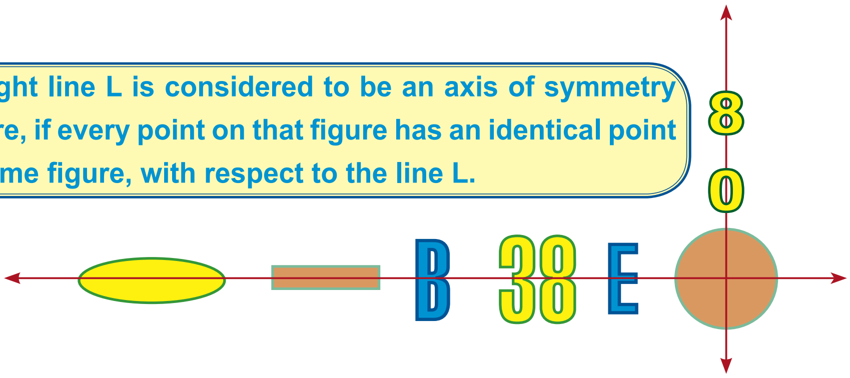
Ⓑ The symmetry axis divides the figure into two ...... halves.

Ⓒ The number of symmetry axes of an equilateral triangle = ......

**Remark**

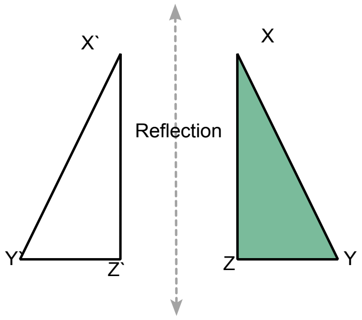



**The straight line L is considered to be an axis of symmetry for a figure, if every point on that figure has an identical point on the same figure, with respect to the line L.**

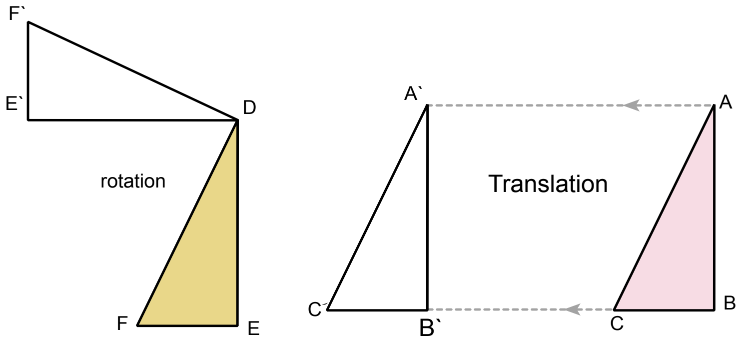



## Geometric transformations

In the opposite figure, the colored triangle is transformed to another position by reflection, translation or rotation according to a certain system known as geometric transformations.




Each geometric translation has a specific meaning. For example, reflecting the figure which is called **(Reflection)**, moving the figure in a certain direction which is called **(Translation)** and turning the figure around a point with a certain angle which is called **(Rotation)**.




**Remark**

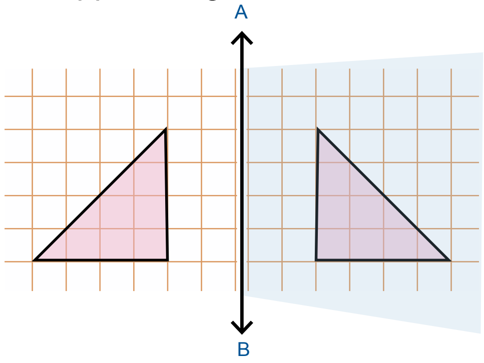
**A geometric transformation transforms every point A in the plane to another point A` in the plane itself.**

4-1

## Reflection

Activity

1. Draw on a graph paper a triangle as shown in the opposite figure.
2. Put a vertical flat mirror on one of the lines like $\overleftrightarrow{AB}$ as shown.
3. Observe the reflection of the triangle in the mirror.




A) Are the lengths of the original triangle straight segments equal to their corresponding images?

B) Are the straight segments drawn from the vertex of the triangle and their corresponding image perpendicular to the axis $\overleftrightarrow{AB}$?

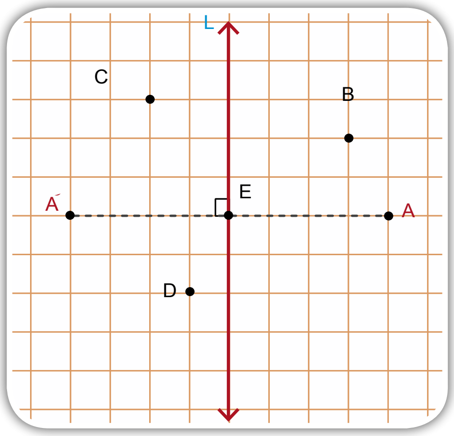
The figure above illustrates a **geometric transformation** called **reflection** and the edge of the mirror represented by $\overleftrightarrow{AB}$ is called the axis of reflection.

## Reflection across a line

### 1 The image of a point by reflection:

To find the image of point A by reflection across line L, draw from point A a perpendicular line to L to intersect it at point E and take A` E = AE where A´ ∈ $\overrightarrow{AE}$

Then point A` is the image of point A by reflection across L.




Practice

In the opposite figure: find the image of points B, C and D by reflection across L.

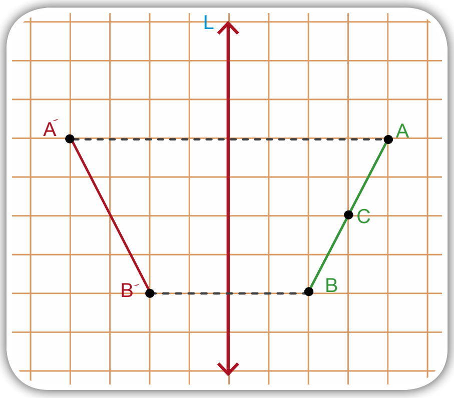
## 2 The image of a line segment by reflection

To find the image of $\overline{AB}$ by reflection across L:

Find the image of point A by reflection across L. Label it A`.

Find the image of point B by reflection across L. Label it B`.

Draw $\overline{`AB`}$ **to be the image of** $\overline{AB}$ by reflection across L.




## Practice

**In the previous figure:**

1. Given that C ∈ $\overline{AB}$ **.** Find the image of point C by reflection across L. Label it C'.
   Does C` ∈ $\overline{A`B`}$ ?

2. **Choose any point ∈ L, Label it D.**
   Find the image of point D by reflection across L. Label it D'
   Does D` coincide on point D? .............

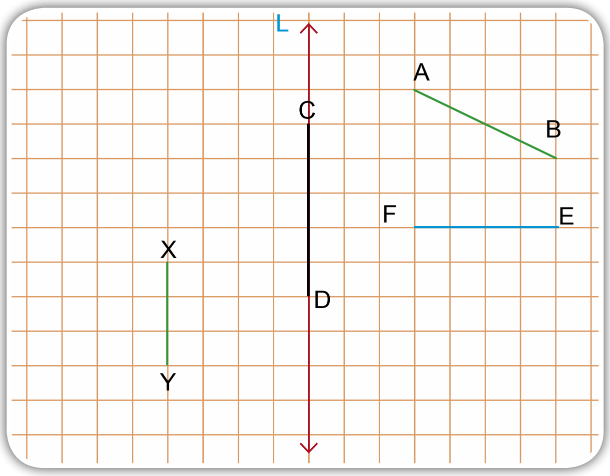
**Remark**

**The image of point A by reflection across line L is** A`, and the image of point B **by reflection** across L is B` **where:**

1. **If** A ∉ **L then L bisects the perpendicular segment** $\overline{AA`}$**.**
2. **If** B ∈ **L, Then** B`**coincides** on B**.**

## Practice

Find the images of the indicated line segments by reflection across L. Then complete:




A) The image of $\overline{AB}$ by reflection across L is ........

B) The image of $\overline{EF}$ by reflection across L is .........

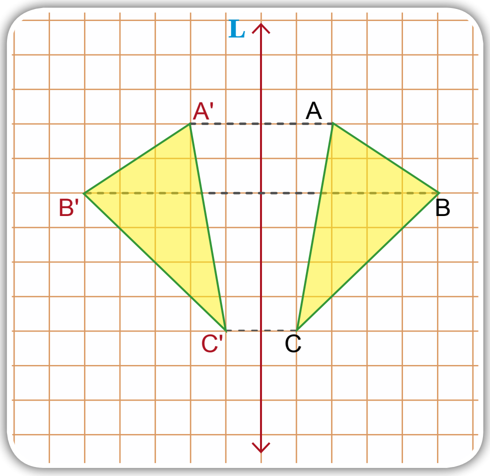
C) The image of $\overline{XY}$ by reflection across L is ......

D) The image of $\overline{CD}$ by reflection across L is .......

**Compare the length of each line segment and the length of its image. What do you conclude?** ........

## 3 The image of a geometric figure by reflection

**1 Find the image of the triangle ABC by reflection across L:**




The triangle ABC is made up of three sides:

$\overline{AB}$ , $\overline{BC}$ and $\overline{AC}$ .

In the opposite figure:

Locate A` the image of A by reflection across L.

Locate B` the image of B by reflection across L.

Locate C` the image of C by reflection across L.

Draw $\overline{A`B`}$, $\overline{B`C`}$ and $\overline{C`A`}$ to get the triangle A` B` C` the image of triangle ABC by reflection across L.

**Remark**

**1**

| | |
|---|---|
| A` is the image of | A |
| B` is the image of | B |
| C` is the image of | C |

i.e. → the image of △ A B C by reflection across L is △ A` B` C`

**2**

| The image | is congruent to | preimage |
|---|---|---|
| △A` B` C` | is congruent to | △ A B C |

i.e. →

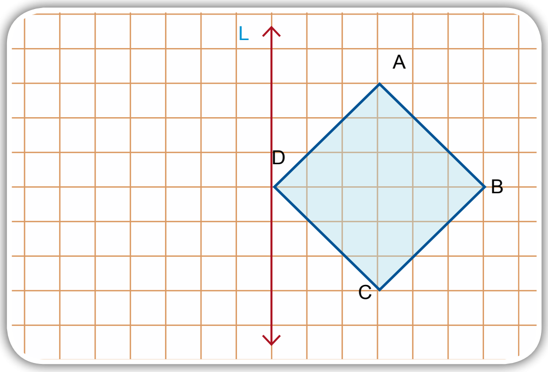
| | |
|---|---|
| A B = A` B` , | m (∠ A) = m(∠ A`) |
| B C = B` C` , | m (∠ B) = m(∠ B`) |
| C A = C` A` , | m (∠ C) = m(∠ C`) |

**2** Find the image of the square ABCD by reflection across L:

Locate point **A`** **the image of A**

Locate point **B`** **the image of B**

Locate point **C`** **the image of C**



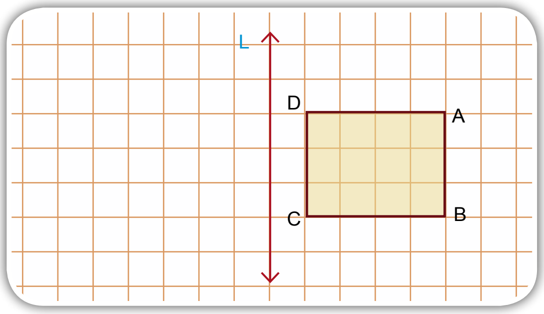

**Remark**

Point D ∈ L then D` concides on the point D itself

∴ The image of square ABCD is square A` B` C` D.

## Practice

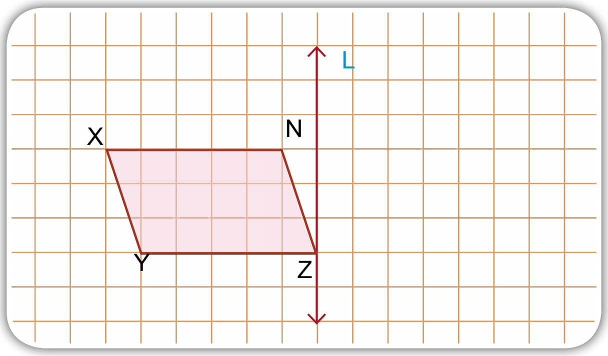
**1** In the opposite figure: Find the image of the rectangle ABCD by reflection across L, then complete:




(A) The image of the rectangle ABCD by reflection across L is the rectangle ........

(B) B C = ........, and m (∠ D) = .....

**2** **In the opposite figure: Find the image of the parallelogram XYZN by reflection across L, then complete:**




**A** The image of the parallelogram XYZN by reflection across L is the parallelogram…

**B** XY = ........and YZ = ........

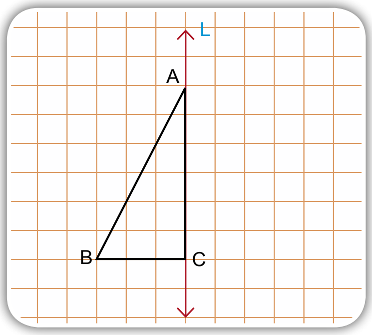
**Remark**

**1** To draw the image of a given figure by reflection across line L, the distance between any point of the figure and the axis of symmetry is equal to the distance of its image and the axis of symmetry but on the other side.

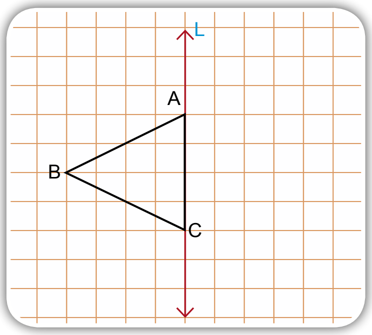
**2** If point B belongs to axis of symmetry L, then its image coincides on the point itself.

**3** **Determine the image of each figure by reflection across L.**

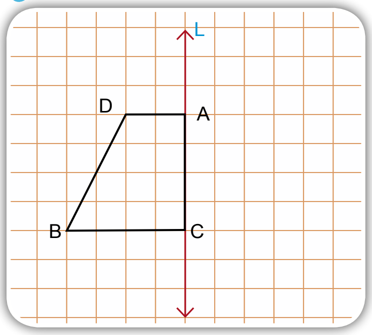
**A**




**B**




**C**




**Refer to the previous figures, complete:**

(1) Each figure and its image are ............

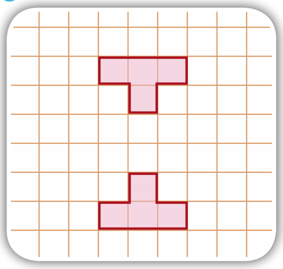
(2) The image of point A is ............ because it ............

(3) The image of point C is ............ because it ............

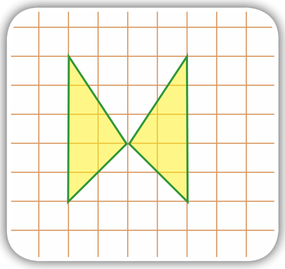
(4) If the paper - where the figure is drawn on - is folded along the axis of symmetry the figure coincides on ............

**4** Draw the axis of symmetry to make one of the following figures an image to the other.

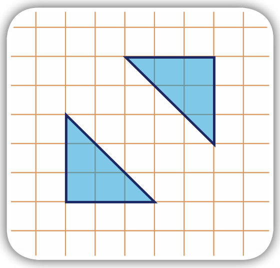
A



B

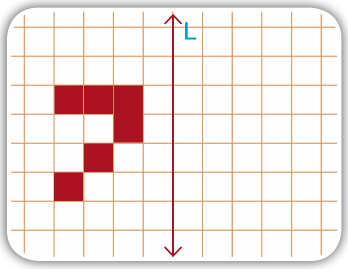


C

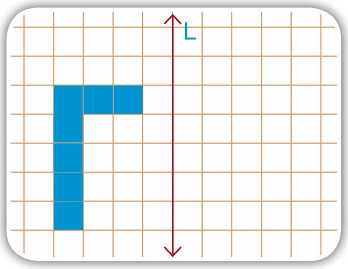


**5** In the following figures, draw the image of the colored figure by reflection across L.

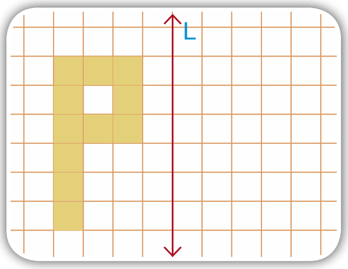
A



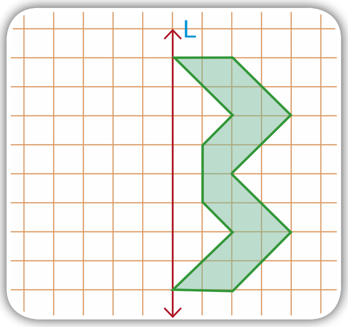

B



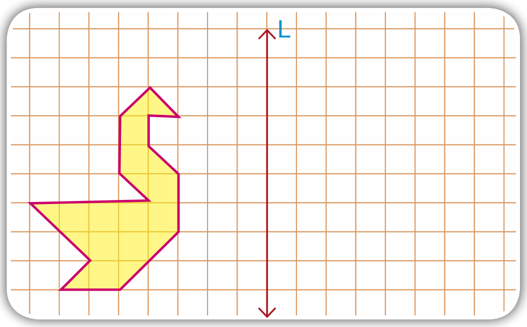

C



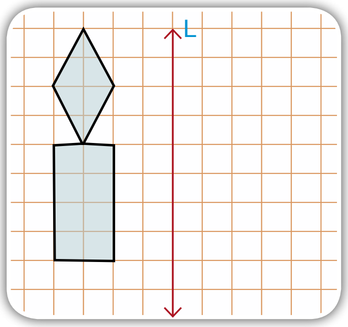

D



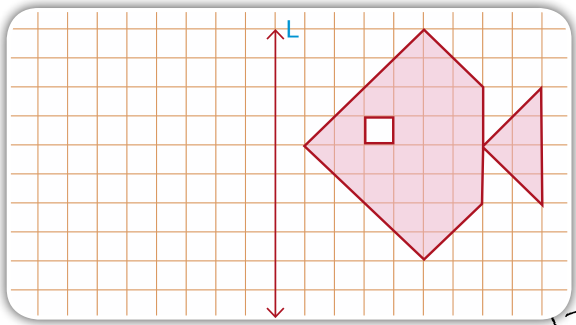

E




F




G



# 4-2

# Locating points on a ray

**You will learn**

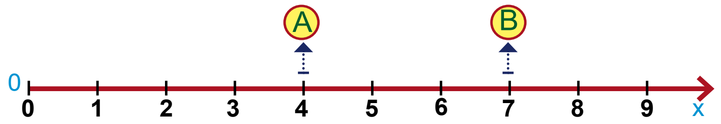
- To locate points representing numbers on a horizontal ray.
- To locate points representing numbers on a vertical ray.
- To locate a point on a coordinate plane.

**Key Terms**

- Horizontal ray
- Vertical ray
- Coordinate plane

## Think and Discuss

**Observe the horizontal ray $\overrightarrow{OX}$ drawn in the following figure:**




Start with point O, which represents the number zero, then locate equidistant points to represent the numbers 1, 2, 3, .........

If point A represents the number 4 and point B represents the number 7, then:

**The length of $\overline{AB}$ = 7 - 4 = 3 units**

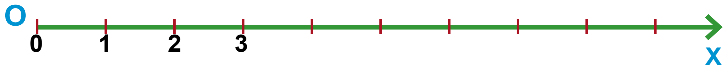
What is the length of the line segment $\overline{OA}$? What is the length of the line segment $\overline{OB}$ ?

Locate point C on the number line to represent the number 9.

What is the length of the line segment $\overline{AC}$ and what is the length of the line segment $\overline{BC}$ ?

## Practice

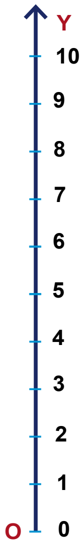
On the horizontal ray $\overrightarrow{OX}$ shown in the following figure:




A. Locate point A to represent the number 1.
B. Locate point B to represent the number 5.
C. Locate point C to represent the number 8.
D. Complete: the length of $\overline{AB}$ = ......... units, the length of $\overline{BC}$ = .........units and the length of $\overline{AC}$ = ......... units.
E. Locate point D that bisects the line segment between A and B.
Which number is represented by point D?

## When the ray is vertical

### Think and Discuss




**In the opposite figure:**

The ray $\overrightarrow{OY}$ is a vertical ray and starts with point O which represents the number zero.

(A) Locate point A that represents the number 3.

(B) Locate point B that represents the number 8.

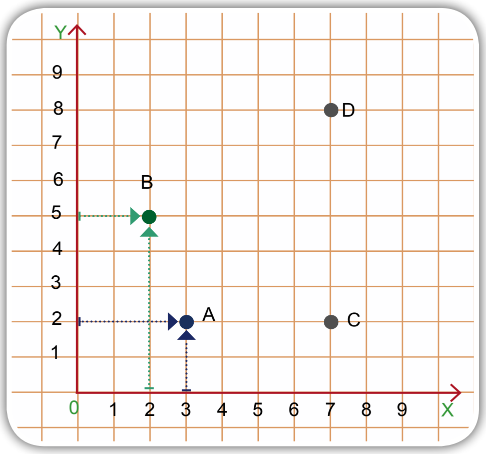
(C) What is the length of $\overline{AB}$ ? .......

(D) If point E is the midpoint of $\overline{OB}$ . What is the length of $\overline{OE}$ ?

## Locating points on a coordinate plane

If the horizontal ray $\overrightarrow{OX}$ and the vertical ray $\overrightarrow{OY}$ are drawn, then a coordinate plane is constructed as shown in the opposite figure. The location of each point is determined by an ordered pair. Each ordered pair determines only one point on the plane.

Where point A (3, 2) and point B (2, 5)




**(1) Complete:**

(A) Point C (…, …) and point D (….., …..)

A C = 4 units and C D = ….. units

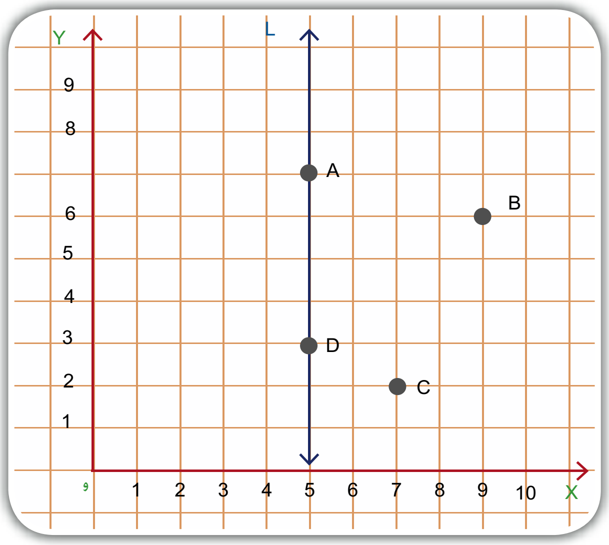
**(2) On the figure above, plot the points M (5, 2) and N (5, 8), then complete:**

C M = ….. units. M N = ….. units. N D = ….. units.

The name of the figure MNDC is ................ and, the perimeter of the figure MNDC is ................ units.

## Exercises

**On the coordinate plane illustrated in the opposite figure:**




**I. Complete:** A (...., ....)

B (...., ....)

C (...., ....)

D (...., ....)

**II.** If L is the the axis of reflection to the figure ABCD, **complete**:

A. The image of B by reflection across L is B`(...., ....)

B. The image of C by reflection across L is C`(...., ....)

C. The image of A by reflection across L is A`(...., ....)

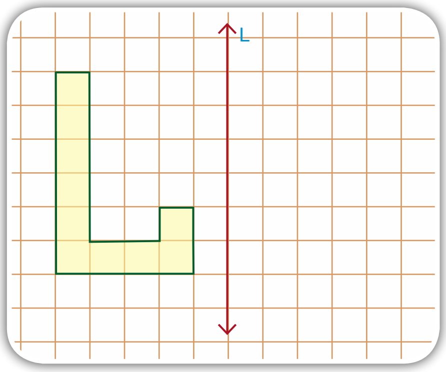
D. The image of D by reflection across L is D`(...., ....)

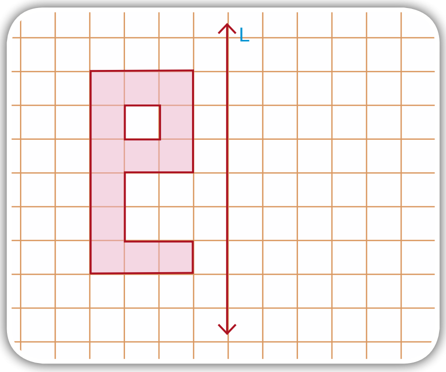
**III: The image of** △ **BCD** by reflection **across L is** ................

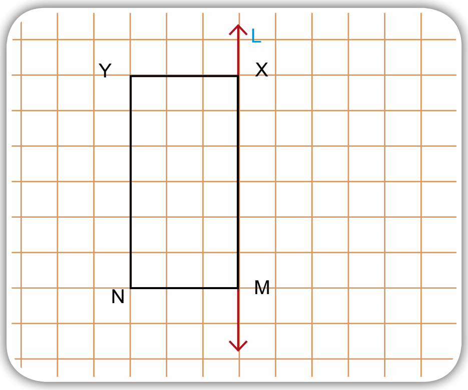
**IV: The image of the figure ABCD** by reflection **across L is** ................

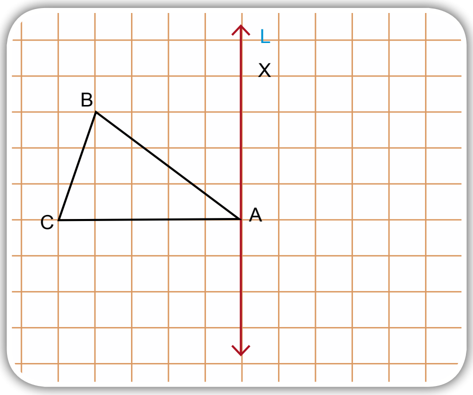
## General Exercises

**1** **Find the image of each of the following figures by reflection across L.**

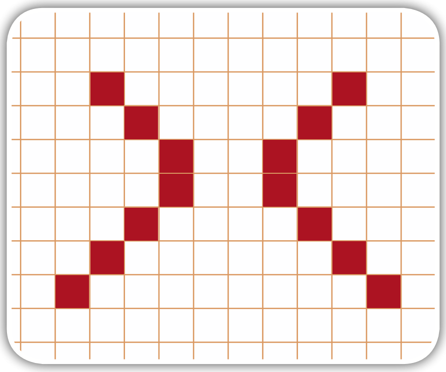


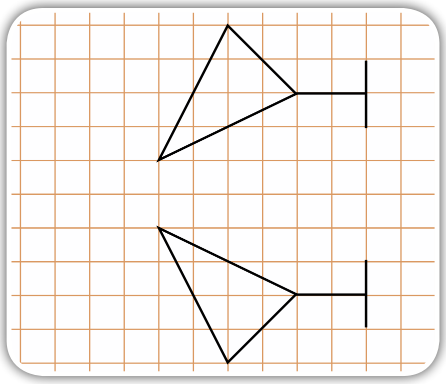



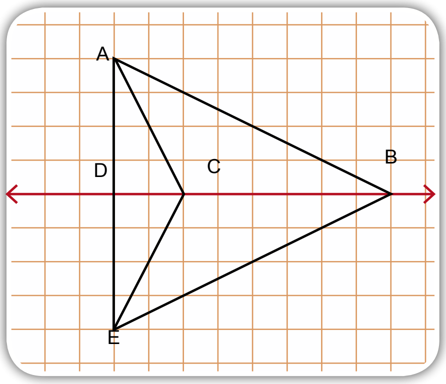

**2** **Draw the axis of symmetry to each figure.**





**3** **In the opposite figure, $\overleftrightarrow{BD}$ is the axis of reflection.**

**Complete:**




**A** The image of △ ABC by reflection across $\overleftrightarrow{BD}$ is ....... ,then

A B = .......and A C = .......

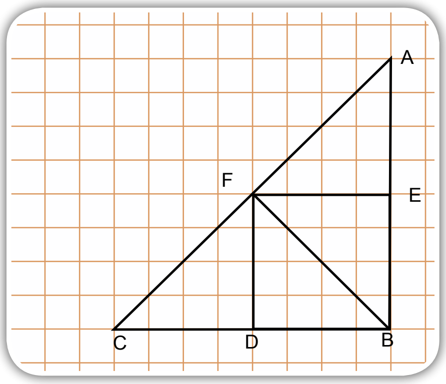
**B** The image of △ A C D by reflection across $\overleftrightarrow{BD}$ is ....... ,then

A D =......and $\overline{CD}$ coincides on ...... ,then

**C** △ A B C is congruent to △ ...... and

△ E C D is congruent to △ .......

**4** **In the opposite figure: complete:**



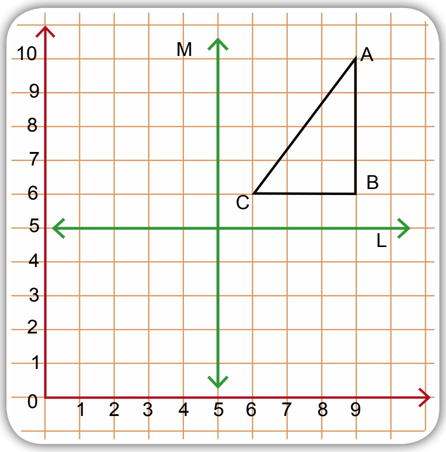

**A** △ BEF is the image of △ AEF by reflection across $\overleftrightarrow{.......}$

**B** △ B D F is the image of △ CDF by reflection across $\overleftrightarrow{.......}$

**C** △ A B F is the image of △ C B F by reflection across $\overleftrightarrow{.......}$

**D** △ BEF is the image of △ BDF by reflection across $\overleftrightarrow{.......}$

**5** **The opposite figure represents a coordinate plane:**



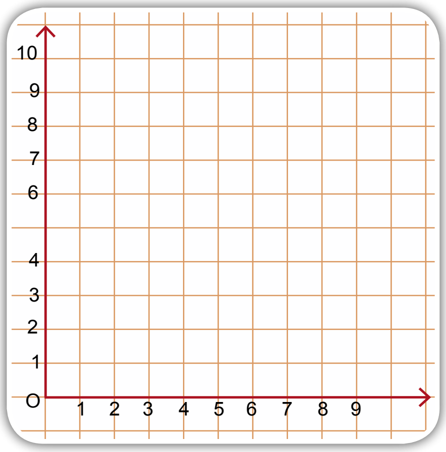

**A** Write the coordinates of points A, B, and C.

**B** Draw △ A\` B\` C\` the image of △ ABC by reflection across (L) and determine the coordinates of the vertices A\`, B\` and C\`.

**C** Draw △ A\`\` B\`\` C\`\`, the image of △ ABC by reflection across M and determine the coordinates of its vertices A\`\`, B\`\` and C\`\`.

Activity

6 On the coordinate plane illustrated in the opposite figure:




A **Plot the folowing points.**

A (2, 2)

B (5, 2)

C (5, 8)

D (2, 8)

B Draw the line segments $\overline{AB}$ , $\overline{AD}$ , $\overline{CD}$ and $\overline{BC}$ .

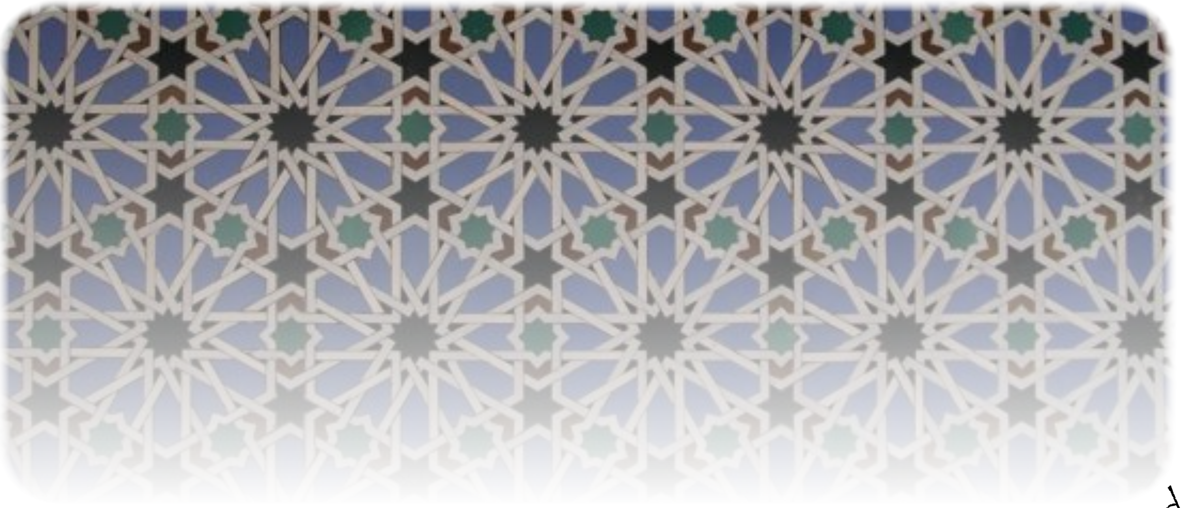
C If $\overleftrightarrow{BC}$ is the axis of reflection of the figure ABCD, then find the image of the figure using the suitable symbols.

D Determine the ordered pairs of the points representing the vertices of the image.

## Activity

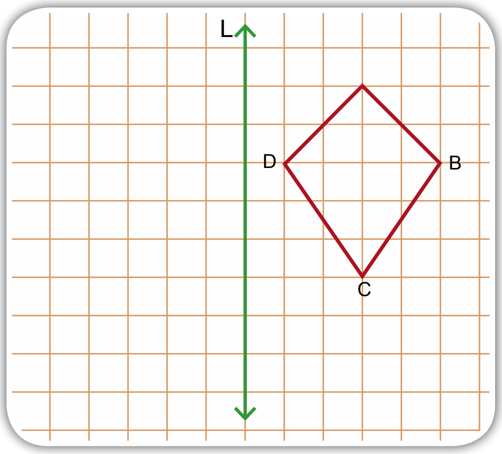
1 Use the coordinate grid net to draw some figures, then locate their images by reflection. Add it to your portfolio.

2 Use the reflection to design your own decorative figures.



# Unit Test

**1** **In the opposite figure: Draw the image of the figure ABCD by reflection across (L).**




**2** **On a coordinate plane:**

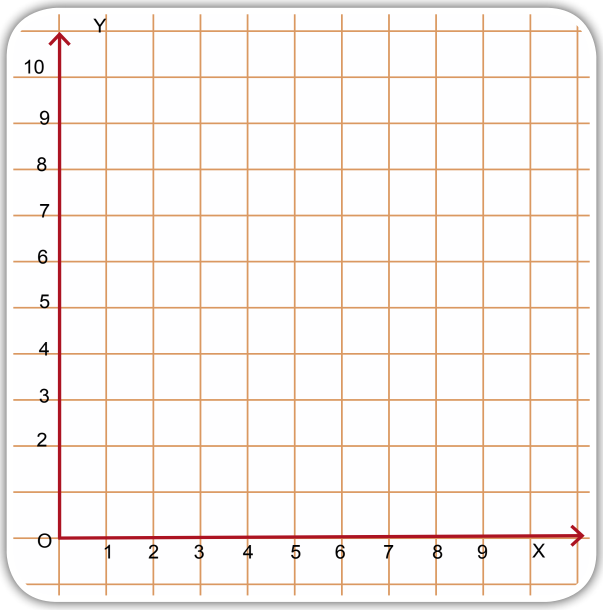
**A** **Plot the following points :**

A (3, 5), B (6, 5) and C (3, 2).

**B** **Find the length of** $\overline{AC}$ **.**

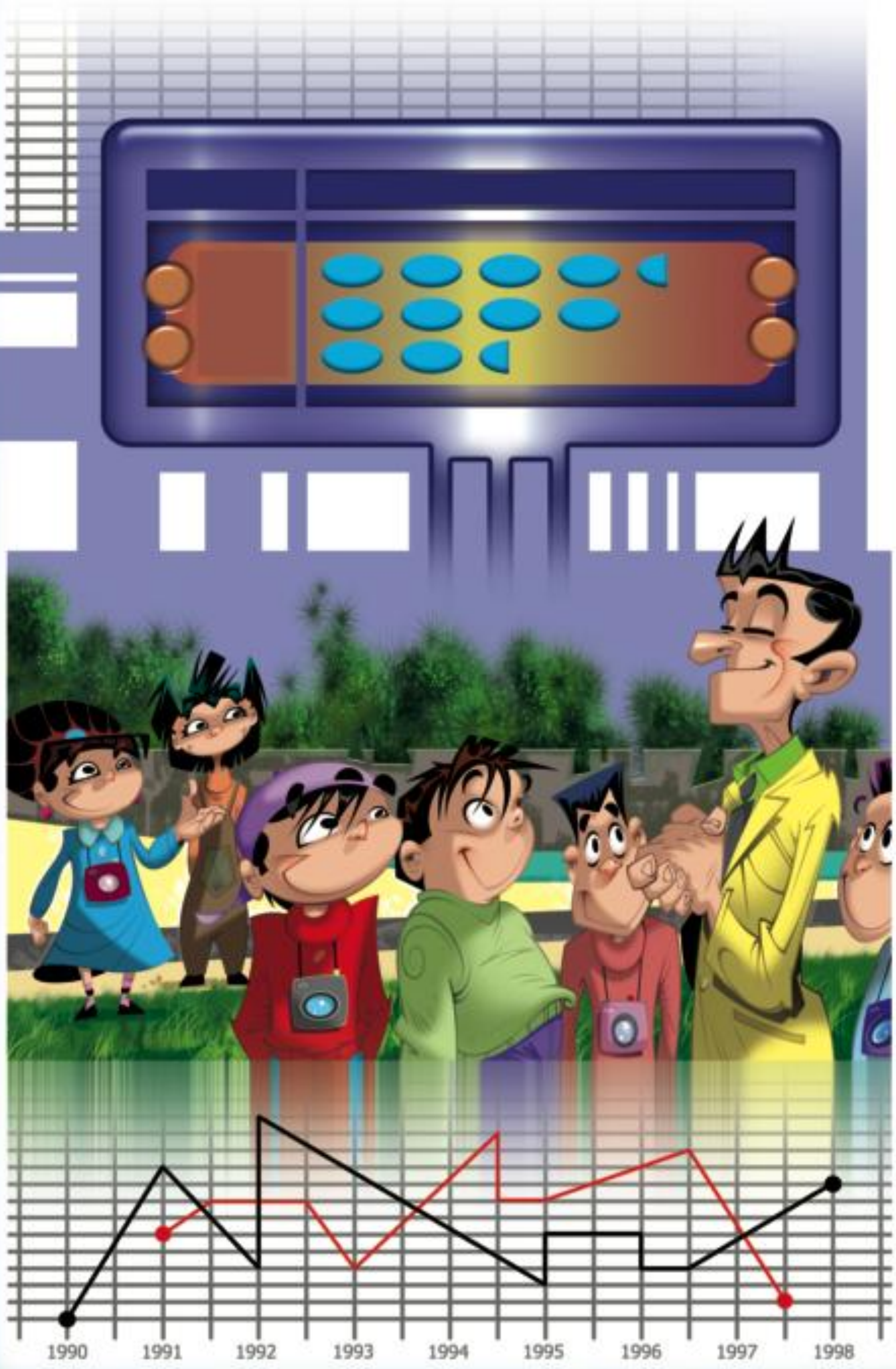
**C** **Find the length of** $\overline{AB}$ **.**

**D** **Draw the image of △ ABC by reflection across** $\overleftrightarrow{AC}$ **and determine the ordered pairs that represent the vertices of the image.**



# Unit 5

# Statistics



# 5-1

## Collecting data

**Think and discuss**

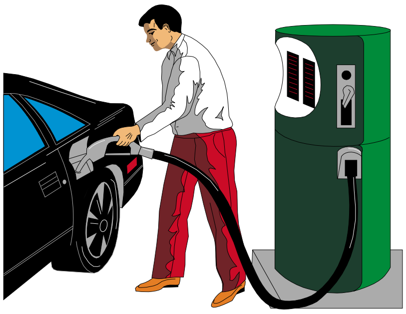
**You will learn**

- To collect data using counting and recording.
- To collect data using measuring.

**Key Terms**

- Collecting data
- Counting and recording
- Carrying out a survey of opinion
- Measuring

Last friday, Ahmed went with his father to the gas station where his father works. He saw cars refueling and he noticed that some cars were refueling with gasoline 80 while other cars were refueling with gasoline 90 and some were refueling with disel.



**Ahmed asked his father about** the difference between each type of gasoline. His father said that gasoline 90 is purer than gasoline 80 and this is suitable for modern cars to preserve the engine while gasoline 80 is used by older cars because it is cheap. However, there is another type of gasoline: gasoline 92 which is the purest of all, but it is not avaliable in that gas station.

As for disel, it is used by trucks and some other cars equipped to use that type of gasoline.

**Ahmed recorded the number of cars and the types of fuel they put in every hour:**

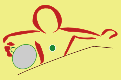
| Type of fuel | Tallies | Frequencies |
|---|---|---|
| gasoline 80 | 𝍸 𝍸 𝍸 𝍸 𝍸 | .......... |
| gasoline 90 | 𝍸 𝍸 𝍸 \| | .......... |
| disel | 𝍸 𝍸 𝍸 𝍸 | .......... |

Complete the following frequency table, then answer the following questions:

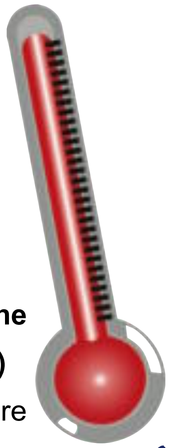
1. What is the most wanted type of gasoline at that station?
2. What is the least wanted type of gasoline at that station?
3. What advice would you give to the manager of that station?

**Activity**

**Carry out a survey on your classmates about the sports practiced by them, then answer the following questions**

| Game | Tallies | Frequencies |
|---|---|---|
| **Football** | ..................... | ..................... |
| **Ping-Pong**  | ..................... | ..................... |
| **Basketball** | ..................... | ..................... |
| **Swimming** | ..................... | ..................... |

1. What is the most popular game for students?
2. What is the least popular game for students?
3. What advice would you give to your classmates who do not take part in any type of these games?



**Activity**

**Use a thermometer and record the tempratures in a week at the following times (8:00 am, 2:00pm, 3:00pm, 6:00 pm and 10:00pm)** Arrange the tempratures of every day in an ascending order. Are there any repeated tempratures? on which days? at what time?

# 5-2

# Organizing and displaying data

**Think and discuss**

**You will learn**

- To organize and display data using the simple frequency table.
- To organize and display data using the cumulative frequency table.

**Key Terms**

- Simple frequency table
- Frequency table with intervals

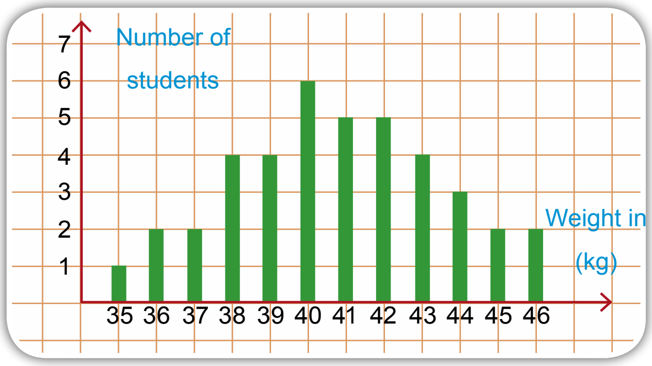
The number of students in my class is 40 students. The senior of the class wanted to record our weights. We brought the scale from the room of the school nurse. Then, we recorded the weights approximated to the nearest kilogram. They were as follows:

41, 37, 40, 42, 44, 41, 45, 38, 42, 43, 37, 38, 42, 46,
39, 45, 40, 36, 40, 38, 42, 42, 41, 40, 43, 39, 40, 41,
39, 41, 43, 40, 39, 38, 35, 46, 44, 36, 44, 43

Our teacher divided us into groups and asked each group to think of a method to organize and display those data.

**The first group thought of the following method:**

| Weight in (kg) | Tallies | Number of students (frequency) |
|---|---|---|
| 35 | \| | 1 |
| 36 | \|\| | 2 |
| 37 | \|\| | 2 |
| 38 | \|\|\|\| | 4 |
| 39 | \|\|\|\| | 4 |
| 40 | ~~\|\|\|\|~~ \| | 6 |
| 41 | ~~\|\|\|\|~~ | 5 |
| 42 | ~~\|\|\|\|~~ | 5 |
| 43 | \|\|\|\| | 4 |
| 44 | \|\|\| | 3 |
| 45 | \|\| | 2 |
| 46 | \|\| | 2 |




**Note that**

**The lightest weight is 35 kgs while the heaviest weight is 46 kgs**

## The second group thought of the following method:

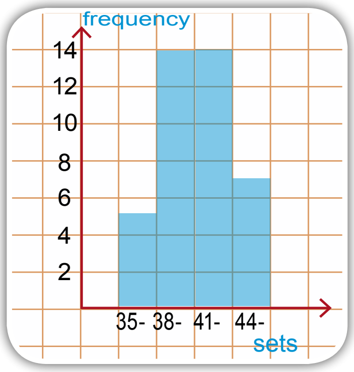
| Weights | Tallies | Frequencies |
|---|---|---|
| 35, 36 | ||| | 3 |
| 37, 38 | 𝍸 | | 6 |
| 39, 40 | 𝍸 𝍸 | 10 |
| 41, 42 | 𝍸 𝍸 | 10 |
| 43, 44 | 𝍸 || | 7 |
| 45, 46 | |||| | 4 |

## The third group thought of the following method:

| Weights | Tallies | Frequency |
|---|---|---|
| 35, 36, 37 | 𝍸 | 5 |
| 38, 39, 40 | 𝍸 𝍸 |||| | 14 |
| 41, 42, 43 | 𝍸 𝍸 |||| | 14 |
| 44, 45, 46 | 𝍸 || | 7 |

it can be written also in the form → where (35-) means that weight is ranging from 35 kgs to less than 38 kgs.

| Sets | Frequency |
|---|---|
| 35- | |
| 38- | |
| 41- | |
| 44- | |



In your opinion, which method of the three is the easiest?

Why?

## Excersises

**1** The following are the marks of 32 students in the final math exam for the first term:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 25 | 30 | 38 | 41 | 47 | 48 | 50 | 32 |
| 37 | 46 | 48 | 26 | 38 | 40 | 42 | 30 |
| 35 | 50 | 40 | 37 | 39 | 48 | 49 | 47 |
| 36 | 45 | 35 | 42 | 41 | 40 | 36 | 44 |

**First: complete:** the lowest mark is ................

the highest mark is ...............

**Second:** Think of a method to display those marks in suitable sets.

Form the cumulative frequency table with sets for these data. Can you display those data in another way? Explain your answer.

**2** The teacher asked the students to head for the student's affairs official in order to determine the days of absence for each student in the class. The number of students was 40 students and the data were as follows:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 5 | 0 | 3 | 1 | 4 | 1 | 2 | 6 |
| 0 | 2 | 1 | 3 | 5 | 4 | 1 | 2 | 1 | 0 |
| 3 | 1 | 0 | 4 | 4 | 2 | 1 | 0 | 1 | 3 |
| 1 | 2 | 6 | 7 | 1 | 4 | 3 | 4 | 2 | 3 |

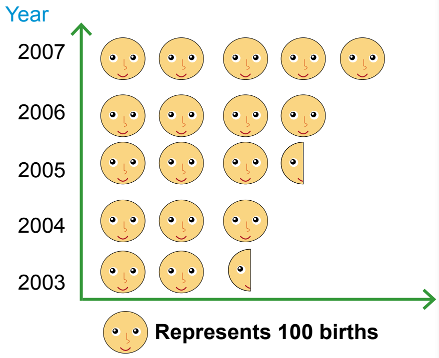
**Form the frequency table that represents these data, then represent them by a bar graph.**

# 5-3

# Reading tables and line graphs

## Think and discuss

The opposite data representation shows the number of babies who were born at a hospital from 2003 to 2007. From the drawing, find:




**First:** The number of births at that hospital in 2005.

**Second:** The increase in the number of births in 2007 compared to 2003.

**Solution**

**First:** The number of births in 2005

$=100 \times 3 + 50 = 350$ births

**Second:** The number of births in 2007

$=100 \times 5 = 500$ births.

The number of births in 2003

$=100 \times 2 + 50 = 250$ births.

The increase of births in 2007 Compared to 2003 =

$500 - 250 = 250$ births.

**think** What is the increase in births at that hospital in 2006 compared to 2004?

**You will learn**

- To represent data using pictures (pictographs).
- To represent data using bar graphs.
- To represent data using double bar graphs.

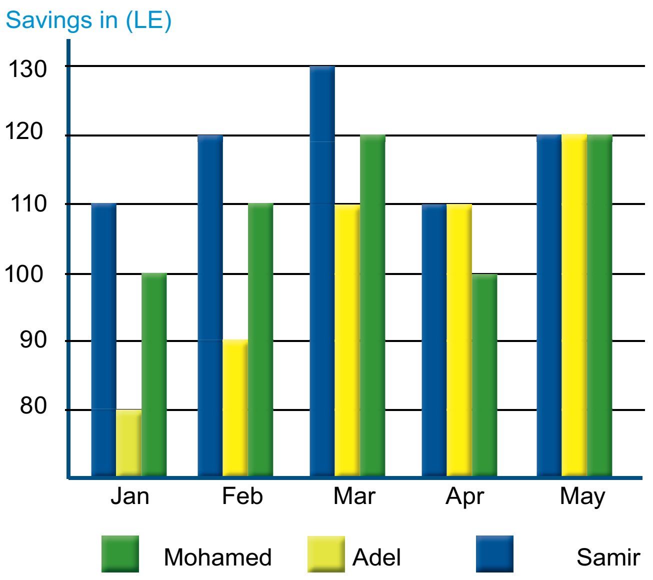
**Key Terms**

- Representing data by pictures (pictographs)
- Representing data by bar graphs
- Representing data by double bar graphs

# 5-3

## Think and discuss

The opposite bar graph shows what Samir, Adel, and Mohamed have saved during the first five months of the year. Complete:



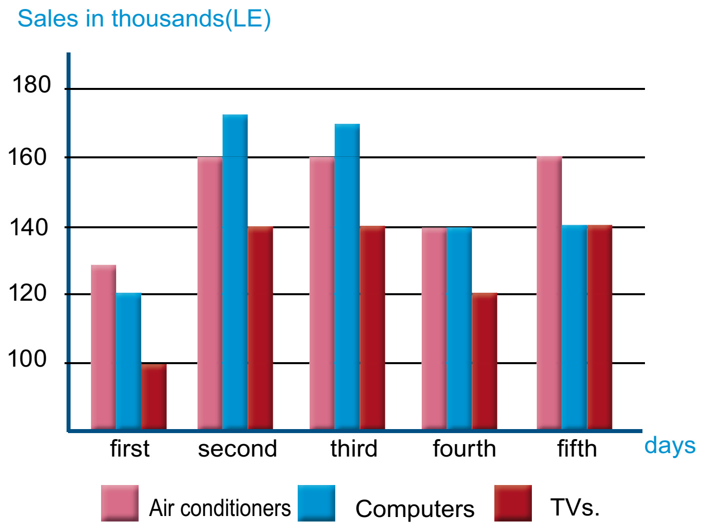

A) The savings of Samir are equal to the savings of Adel in April and in .........

B) The savings of Mohamd are equal to the savings of Adel in .........

C) The savings of Samir are greater than the savings of Adel in .........,......... and .........

## Practice

The following figure shows the sales of TVs, computers, and air conditioners in thousands of pounds in a store during five successive days:




Complete:

A) The day in which the sales of air conditioners are equal to the sales of computers is .........

B) The day in which the sales of the TVs are equal to the sales of computers is .........

C) The days in which the sales of computers are greater than the sales of televisions are ........and ........

D) The days in which the sales of TVs are smaller than the sales of air conditioners are .........

5-4

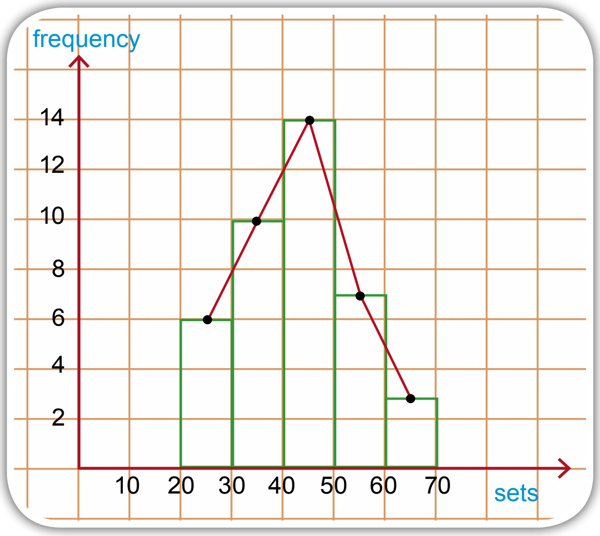
# Representing data by the histogram and the frequency polygon

**Think and discuss**

Magdy and Yasser visited a company to collect some data about the daily wages paid for workers. They recorded the data and formed the following cumulative frequency table with sets.

| Sets | 20- | 30- | 40- | 50- | 60- | Total |
|---|---|---|---|---|---|---|
| Frequency | 6 | 10 | 14 | 7 | 3 | 40 |

Their teacher asked them to represent the data using the frequency polygon.




**Magdy said:**

First, I can draw the histogram that I learned, then:

1. I bisect the upper bases of the rectangles that form the histogram.
2. I draw line segments that join the points of bisection in order.
3. The union of the line segments is called the frequency polygon. In the above figure, it is colored in red.

**You will learn**

- To represent data using the frequency polygon.

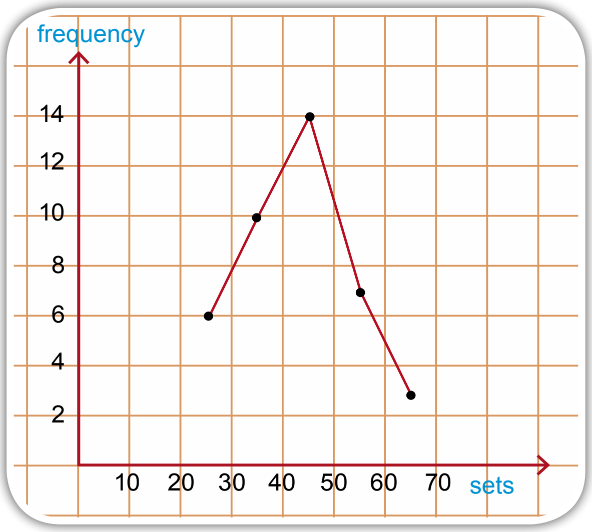
**Key Terms**

- The frequency polygon

# 5-4

**Yasser said:**

I would follow another method to draw a frequency polygon as follows:




1. I would draw the two axes (the horizontal and the vertical), then I would divide each of them into equal parts to distribute the given data.

2. I would determine the center of each set. For example, the set 20- its center is $\frac{30 + 20}{2}$ = 25, The set 30 - its center is 35 and so on......

3. I would determine the points which represent the ordered pairs (the center of the set, the frequency).

4. I would draw line segments that join these points in order, thus I would finish drawing the frequency polygon.

**think**

Which method would you prefer: Magdy's or Yasser's method? and why?

**Practice**

The following table represents the marks of 50 students in the math exam in a month, where the full mark is 50.

| Sets | 10 - | 20 - | 30 - | 40 - | Total |
|---|---|---|---|---|---|
| Frequency | 10 | 12 | 18 | 10 | 50 |

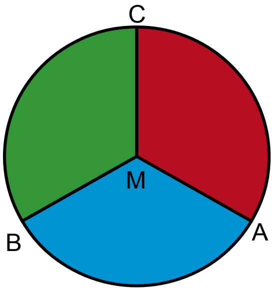
**Draw the frequency polygon which represents the given data.**

5-5

# Representing data using the pie graphs

## Think and discuss

In the following figure; A circle whose center is M has the radii $\overline{MA}$, $\overline{MB}$ and $\overline{MC}$ Those radii divide the surface of the circle into 3 equal sectors, each of them is called a pie graph.




### You will learn

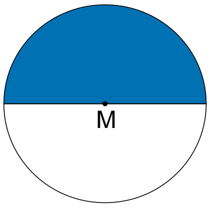
☺ To represent data using pie graphs.

### Key Terms

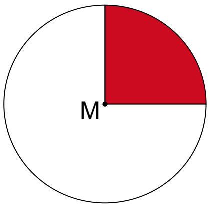
☺ Pie graph

## Practice

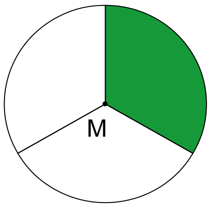
**Complete:**




The colored sector represents ....... of the circle




The colored sector represents ....... of the circle




The colored sector represents ....... of the circle

## Example

Ahmed, Hossam and Hanan have bought Pizza for dinner and paid LE 24. Ahmed paid LE 12, Hossam paid LE 8, and Hanan paid the rest. The pizza has been divided into sectors according to the amount of money each paid. Graph the given data.

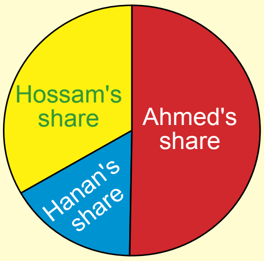
**Solution**

Hanan paid = 24- (12 + 8) = L.E 4

Ahmed's share = $\frac{12}{24}$ of the pizza = $\frac{1}{2}$ of the pizza.

Hossam's share = $\frac{8}{24}$ of the pizza = $\frac{1}{3}$ of the pizza.

Hanan's share = $\frac{4}{24}$ of the pizza = $\frac{1}{6}$ of the pizza.



# Exercises

**1** The following table shows the recorded tempratures in 40 cities on a day.

| Temperatures | 20 - | 22 - | 24 - | 26 - | 28 - | Total |
|---|---|---|---|---|---|---|
| **Number of cities** | 7 | 9 | 11 | 8 | 5 | 40 |

Required:

**A** The number of cities with temperatures less than 24 degrees Celsius.

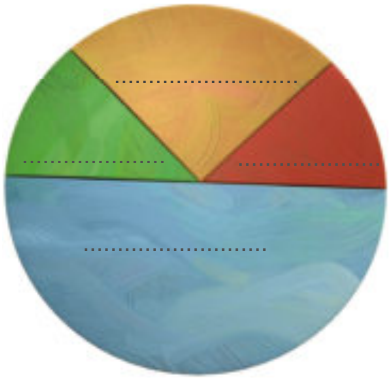
**B** Draw each of the histogram and the frequency polygon.

**3** The following frequency distribution shows the marks of a group of students in an exam.

| Sets | 5 - | 10 - | 15 - | 20 - | 25 - | 30 - | 35 - | Total |
|---|---|---|---|---|---|---|---|---|
| **Number of students** | 3 | 6 | 8 | 12 | 10 | 6 | 5 | 50 |

**First:** What is the number of students who got 30 marks or more.
**Second:** Draw the frequency polygon for that distribution.

**3** An employee spends his salary as follows:
LE 200 for clothes.
LE 800 for food.
LE 400 for transportation and medicine.
LE 200 for renting an apartment.
Graph that data on the opposite circle.



**4** A librarian made an inventory of the books in his library and their types. He found the following: $\frac{1}{4}$ of the books are religious, $\frac{1}{4}$ of the books are literary, $\frac{1}{2}$ of the books are scientific.
Graph that given data using a pie graph. If the total of books was 800, find the number of each type of books.

# Activity

When some students were asked about the most popular TV programs, the following data were extracted:

$\frac{1}{2}$ of the students like to watch sports programs.

$\frac{1}{4}$ of the students like to watch cultural programs.

$\frac{1}{8}$ of the students like to watch Arabic and foreign movies.

$\frac{1}{8}$ of the students like to watch news.

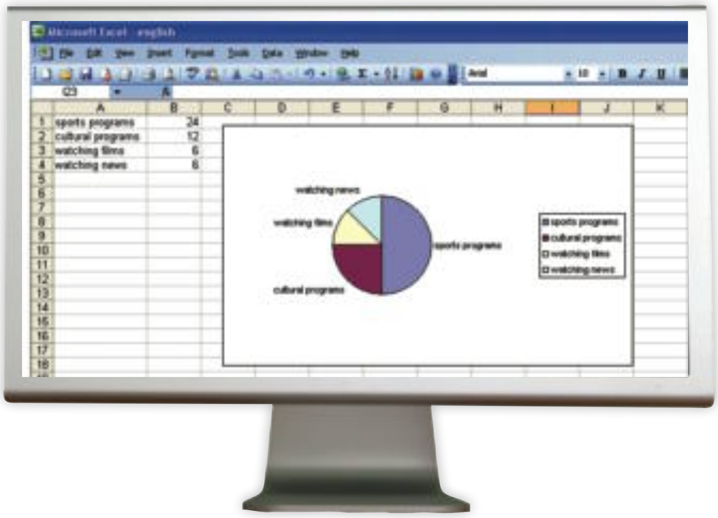
**A** **Represent that given data using a pie graph.**

**B** **If the number of students in the class was 48 students, what is the number of students who prefer watching each type of programs?**

# Technology

## Using technology to solve the portfolio

1. Open the excel program.
2. Record data in the column A (types of programs) in the colum B (number of students).
3. Shade the data in A and B by the mouse.
4. From the insert bar, do a mouse click on chart then pie after that next and next and finish. You will have the required pie graph.




**Use the Excel program to solve problem No(4) on page (96)**

# Test

## Unit test

**1** **The following table shows the frequency of the marks of some students in Mathematics.**

| Sets | 5 - | 10 - | 15 - | 20 - | 25 - |
|---|---|---|---|---|---|
| Frequency | 卌 | 卌 卌 | 卌 卌 卌 | 卌 \|\| | \|\| |

**First:** Rewrite the previous frequency table representing the frequencies by numbers.

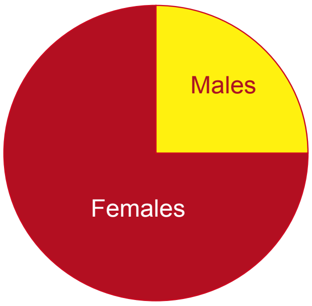
**Second:** What is the number of students who got marks less than 15.

**Third:** Draw the frequency polygon for that distribution.

**2** **Draw the frequency polygon for the following frequency distribution:**

| Sets | 10 - | 12 - | 14 - | 16 - | 18 - | 20 - | Total |
|---|---|---|---|---|---|---|---|
| Frequency | 2 | 5 | 7 | 11 | 6 | 4 | 35 |

**3** 220 candidates have applied for a test to hire male and female anchor persons in the televison. If the opposite pie graph represents the given data; what is the number of female candidates who applied for that test?



# Test (I)

Test

**1** **Circle the true answer :**

(A) The sum of two natural numbers ........ N. ($\in$ or $\notin$ or $\subset$ or $\not\subset$)

(B) If X + 3 = 5, X $\in$ N then X = ......... (1 or 2 or 3 or 4)

(C) The area of a rhombus whose diagonals lengths are 6 cm and 8 cm is ........ $cm^2$ (48 or 12 or 24 or 40)

**2** 1) **Complete to make the sentence true:**

(A) The circumference of a circle with radius lengths 10 cm is ...$\pi$ cm.

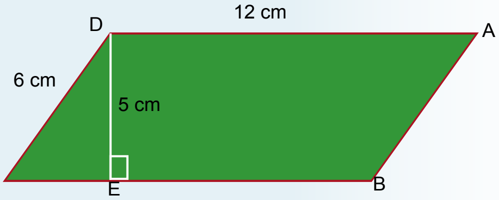
(B) For any natural numbers a, b and c: ( a X b ) $\times$ c = a $\times$ (b$\times$c ) is called ........ property.

2) Which is greater in area: a square whose diagonal length is 10 cm or a right angled triangle whose legs are 8 cm and 15 cm ?

**3** Ahmed has LE X , Samir has LE 10 and the sum of what Samir has and the twice of what Ahmed has is LE 24. Write an equation to represent this situation and find the value of X.

**4** (A) In a 2-dimensional coordinate plane : Draw the triangle ABC where A (2,1), B (5, 1) and C (5, 5), then draw the image of the triangle ABC by reflection across $\overleftrightarrow{BC}$ and find the sum of areas of the triangle and its image

(B) In the opposite figure ABCD is a parallelogram, where AD = 12 cm , CD = 6 cm , DE = 5 cm and $\overline{DE} \perp \overline{BC}$ . Find the area of the parallelogram, then calculate its height drawn from point D on $\overleftrightarrow{AB}$ .




**5** 1) **Compare using > , < or =**

(A) The additive neutral element in N ........ the multiplicative neutral element in N.

(B) The value of X, when X + 1 = 3........ the value of X when 2 x = 6.

**2) The following frequency table shows the marks of 35 students in the math exam. Graph these data using the frequency polygon :**

| Sets | 5 - | 10- | 15 - | 20 - | 25 - | Total |
|---|---|---|---|---|---|---|
| Frequency | 5 | 9 | 11 | 6 | 4 | 35 |

Test

# Test (2)

**1 Complete to get a true sentence.**

A. The area of a square = $\frac{1}{2}$ the product of........ $\times$ ........

B. For a $\in$ N, b $\in$N , then a $\times$ b ........ N

C. 23 $\times$ (92 + 8 ) =23 $\times$ ........ = ........

D. If X = { x : x $\in$ N, 1 $\leqslant$ X < 5} then x = {........ , ........, ........, ........}

**2 Circle the true answers :**

A. The area of a triangle whose base length 5 cm and the corresponding height 6 cm is … cm$^2$ . (30 - 15 - 25 - 36 )

B. If the set of even numbers is E, then E.....N ($\in$ - $\notin$ - $\subset$ - $\not\subset$)

C. If the longest chord in a circle is 7 cm then the circumference of the circle is ..... cm where $\pi = \frac{22}{7}$ (3.5 - 7 - 22 - 44)

**II . Draw the rectangle ABCD where AB = 2cm, BC = 3cm and find its image by reflection across $\overleftrightarrow{CD}$**

**3** A. ABCD is a rhombus in which AC = 10cm and BD = 8cm.

(1) Find its area .

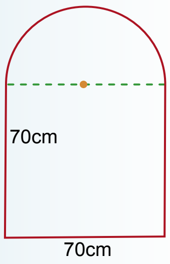
(2) Find the image of $\triangle$ ABC by reflection across $\overleftrightarrow{AC}$ .

B. Hatem bought 3 notebooks , where the price of each is LE x . He gave the seller LE 20 and he still has LE 5. Write an equation to represent this information and find x.

**4** A. In 2-dimensional coordinate plane locate the points A (3, 0) B (5, 0) C (0, 5) and D (0, 3) Find the area of the shape ABCD.

B. Use the commutative and associative properties in N to calculate: 872+199+128+801

**5** A. In the opposite figure, there is a window which has the form of a square whose side length is 70 cm, and above it, there is a semi circle. Calculate:




(1) The perimeter of the window .

(2) If the area of the window is 8750cm$^2$ ,then find the area of the semi circle.

B. The following is a frequency distibution for the working hours of 50 workers. Graph these data using the frequency polygon.

| Sets | 2- | 4- | 6- | 8- | 10- | total |
|---|---|---|---|---|---|---|
| Frequency | 8 | 9 | 15 | 16 | 2 | 50 |

# Test (3)

Test

**1** **Circle the true answer :**

(A) If $x + 7 = 19$, $x \in N$ then x = ........ (26 , 12 , 11 , 13).

(B) The area of a square whose diagonal length 6cm is ........

($18cm^2$ , $36cm^2$ , $12cm^2$ , $6cm^2$)

(C) If $X = \{x : x \in N, 3 < x < 4\}$ then $X \in$ ........ ($\varnothing$ , $\{3, 4\}$ , $\{3\}$ , $\{4\}$)

**2** **First : Complete to get a true sentence**

(A) The circumference of a circle whose diameter length X cm is ........ cm.

(B) If the area of a rhombus is 16 $cm^2$ and the length of one diagonal is 4 cm, then the length of the other diagonal is ........ cm

**Second:**

(A) Which is greater in area : A rhombus whose diagonals are 6cm and 8cm, or a square whose diagonal is 8 cm?

(B) Solve $2x + 9 = 21$, $x \in N$

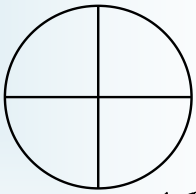
**3** **First:** In a 2 – dimensional coordinate plane , locate the points A (5, 0), B (9, 0) , C (9, 4) and D (5, 4). Name the shape ABCD and find its area.

**Second:** Use operations properties in N to calculate : $25 \times 9892 \times 4$

**4** The opposite figure shows a football playground. Find the distance around the figure when $\pi = \frac{22}{7}$

**5** **The following table shows the number of students who practice sports. Represent these data using pie graph on the opposite figure:**

| Game | Football | Basketball | Volleyball |
|---|---|---|---|
| Number | 20 | 10 | 10 |



# Test (4)

**1 Circle the true answers:**

A) The sum of two numbers a,b is 10, them b = (10 - a , a - 10 , s, a).

B) If 3 x = 15, x ∈ N, then x = ........ (5 , 12 , $\frac{1}{5}$ , $\frac{1}{3}$)

C) The area of a rhombus whose diagonals 10 cm and 20 cm is ........ $cm^2$

(200 , 30 , 100 , 400)

**2 Complete to get a true sentence:**

A) The circumference of a circle whose radius length r = π X ........

B) The smallest natural number is ................

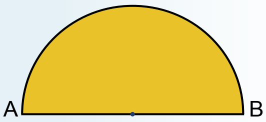
C) The length of the diagonal of a square with area 50 $cm^2$ = .........

D) The area of a parallelogram whose base length is 8 cm and height 2.5 cm is ........ $cm^2$.

**3** **I:** In the opposite figure :

The length of the diameter $\overline{AB}$ of a semicircle is 14 cm.

Find the distance around the figure **($\pi = \frac{22}{7}$)**

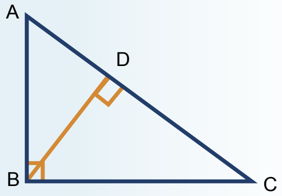



**II:** Use operations properties to calculate : 653 + 548 + 347

**4** A) If X = {x : x ∈ N , 3 ⩽ x < 8}. Use the listing method to write X then represent its elements on a number line

B) △ ABC is a right angled triangle at B. AB = 6cm, BC = 8cm and AC = 10cm Find the area of the triangle, then draw $\overline{BD} \perp \overline{AC}$ and find the length of $\overline{BD}$ .

C) Three times of a natural number x is 8 more than the multiplicative neutral. Express this information in an equation and solve it for x



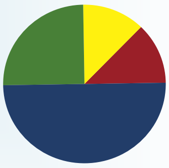

**(1)** Draw △ ABC where A (2, 5) and B (5, 2) and C (5, 8).

Then find its image by reflection across $\overleftrightarrow{BC}$

**(2)** A farm has an area of 24 feddans planted with fruit, vegetables, flowers and palm trees, and it is represented by the opposite figure. Complete:

A) The area planted with vegetables is 12 Feddans and it is represented by the ........ color.

B) The green sector represents the area planted with fruit and it has an area of ........ feddans.



C) The area planted with flowers = the area planted with palm trees = ........feddans.

# The final revision on 2nd term

## The first unit: Natural numbers

### First: Complete the following to get a correct statement:

1. The additive neutral element in (N) is ............... While the multiplicative neutral element in (N) is ...............
2. The least natural number is ...............
3. The least number in the set of counting numbers is ...............
4. The set of natural numbers less than 5 is ...............
5. The set of natural numbers which are more than 4 and less than 9 is ...............
6. The set of prime numbers which are less than 14 is ...............
7. The multiplicative neutral element in natural numbers plus 99 = ...............
8. If $X = \{\chi : \chi \in N , 1 \leq \chi < 6\}$ then X = ...............
9. If $\chi$ is an odd number then $\chi + 2$ is ............... number.
10. The number 7 lies on the right of the number ............... directly and on the left of the number ............... then 7 > ............... , 7 < ...............
11. If $7 \times 15 = 15 \times \chi$ , then $\chi$ = ...............
12. If $945 = (\chi \times 100) + 45$ , then $\chi$ = ...............
13. If $4 \times 35 = (\chi \times 5) + (\chi \times 30)$ , then $\chi$ = ...............
14. If $86 = 6 + \chi \times 10$ , then $\chi$ = ...............
15. 53 + 48 + 47 = (53 + ...............) + 48 = ............... + ............... = ...............
16. If $86 \times 15 = 86 \times \chi + 86 \times 10$ , then $\chi$ = ...............
17. 1 , 4 , 8 , 13 , ............... , ............... in the same pattern.
18. (137 + ...............) – (64 + ...............) = 200 – ............... = 100
19. $\frac{16 - \cdots\cdots}{8} - \frac{\cdots\cdots - 25}{5}$ = zero.
20. If $\chi$ is an odd number , then $(\chi - 1)$ is ............... number.
21. 1 , 1 , 2 , 3 , 5 , 8 , ............... , ............... (in the same pattern).

### Second: Choose the correct answer from those between brackets:

1. 1 , 4 , 9 , 16 , ............... (23 or 24 or 25)
2. If $X = \{\chi : \chi \in N, 3 \leq \chi < 5\}$, then X = ............... ({4} or {3} or {3 , 4} or {4 , 5})

3. If O is the set of add numbers , then O .............. N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
4. The set of even numbers (E) $\cap$ the set of numbers (P) ........ (P or O or N or {2})
5. (49 ÷ 7) .............. N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
6. (χ – 15) .............. (χ – 14) where χ is a natural number more than 17 (> or < or ≤ or ≥)
7. The least prime number × any prime number = .............. number. (add or even or prime or otherwise)
8. (4 × ..............) × 78 = 7800 ( 5 or 25 or 50 or 125)
9. (5 – 7) .............. N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
10. 8 × .............. = .............. × 8 = 1000 ( 992 or 25 or 125 or 250)
11. $\frac{24 - 6}{12 - 9}$ .............. N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
12. {2, 3, 0.4} .............. N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
13. 6 + 20 ÷ 4 × 5 = .............. ( 5 or 25 or 31 or 7)

**Third:**

1. Use the distributive property to get the product of each of the following:
   - A) 18 × 99 = ..............
   - B) 56 × 1002 = ..............
   - C) 517 × 99 = ..............
   - D) 316 × 1001 = ..............
2. If $\cup$ = { χ , χ $\in$ N , 1 ≤ χ ≤ 7 } ,X is the set of factors of the number 6, Y = {3 , 6 , 5} find
   - A) X $\cap$ Y
   - B) X $\cup$ Y
   - C) X – Y
   - D) X`
   - E) Y' (f) (Y – X)'
3. Write by the list method the set X = {χ : χ $\in$ N , 3 ≤ χ < 8} , then represent its elements on the number line.
4. Using the properties of commutation and association in N to find the result of addition in each of the following (Write the used property)
   - A) 872 + 199 + 128 + 801 = ..............
   - B) 413 + 152 + 187 + 348 = ..............
   - C) 156 + 871 + 344 + 129 = ..............
   - D) 642 + 173 + 358 + 27 = ..............
   - E) 612 + 154 + 88 + 846 = ..............
   - F) 192 + 488 + 308 + 12 = ..............

5. Use the distributive property to get the product in each of the following

   A. $98 \times 54$    B. $299 \times 17$    C. $304 \times 25$

6. Use the properties of commutation and distribution and association to get the result of each of the following , then check your answer by using the calculator

   A. $100 (312 + 75 + 188) =$ ..............
   B. $84 (25 \times 4 + 125 \times 8) =$ ..............
   C. $(64 + 135 + 36 + 65) \times 17 =$ ..............
   D. $76 (5 \times 400 - 125 \times 16) =$ ..............
   E. $83 (125 \times 8 - 45 \times 20) =$ ..............
   F. $20 (5 \times 8 - 16) =$ ..............

7. If $\chi$ is a prime number included between 5 and 9 write down the values of $\chi$ , then represent the values of $\frac{\chi}{2}$ on the number line.

8. If $\chi$ is a prime number included between 1 and 6 write down the values of $\chi$ , then represent the values of $\frac{30}{\chi}$ on the number line.

9. Five consecutive odd numbers , its middle number is $(\chi + 12)$ write down these numbers

10. If $\chi + 3$ is the smallest number of four consecutive even numbers. Write down these numbers.

11. Find the three next numbers in each of the following patterns

   A. 214 , 210 , 206 , .............. , .............. , ..............
   B. 5 , 15 , 25 , .............. , .............. , ..............

## The Second Unit: The equations

### First: Complete each of the following to get a correct statement:

1. If we add 3 to twice the number $(\chi)$, then we will get the number ..............
2. If we add 5 to three times the number (Y), then we shall get the number ............
3. If we subtract 8 from twice the number (Z), then we shall get the number ............
4. If we divide the number $(\chi)$ by 3 and add 3 to the quotient, then we shall get the number ..............
5. If we multiply the number (L) by 5 the number, then we subtract from the result 6, then we shall get the number ..............

6. If $16 - \chi = 9$, then $\chi =$ ...............
7. If $4 + \chi = 18$, then $\chi =$ ...............
8. If $3\chi + 7 = 19$, $\chi \in N$, then $\chi =$ ...............
9. If $(\chi + 2) \times 15 = 8 \times 15$, then $\chi =$ ...............
10. The length of a rectangle exceeds the width by 5, If the width of the rectangle $= \chi$ cm, then its length = ............... cm.
11. The width of a rectangle is $\chi$ cm, Its length is longer than twice its width by 3 cm, then the length of the rectangle is ............... cm.
12. A rectangle in which, the length is more than its width by 4 cm. If the length of the rectangle is $\chi$ cm, then its width = ............... cm.
13. The perimeter of a rectangle is 16 cm and its width $= \chi$, then length = ...........cm.
14. The sum of two numbers is 35, one of them is $\chi$, then the other is ...............
15. The product of two numbers = 42, one of them is $\chi$, then the other is ...............
16. If $35 + (12 + \chi) = (35 + 12) + 19$, then $\chi =$ ...............
17. If $37 \times 15 = (7 + \chi) \times 15$, then $\chi =$ ...............
18. If $15 \times 34 = (5 + 10) \times \chi$, then $\chi =$ ...............

**Second: Choose the correct answer from these given:**

1. The difference between two numbers is 5 the smaller one is Y, then the greater number is ............... ( 5Y or 5 – Y or Y – 5 or Y + 5)
2. If $\chi + 8 = 15$, $\chi \in N$, then $\chi =$ ............... ( 23 or 7 or 6 or 5)
3. If $\chi - 3 = 5$, $\chi \in N$, then $\chi =$ ............... ( 8 or 2 or 6 or 7)
4. X and Y are two numbers where their sum is 20, then Y = ...............
($20 + \chi$ or $20 - \chi$ or $\chi - 20$ or $\frac{\chi}{20}$)
5. If we multiply the number $\chi$ by 7, then we subtract from the result 3 we shall get ............... ($7\chi + 3$ or $3\chi + 7$ or $7\chi - 3$ or $\chi - 21$)
6. The sum of the two number is 15, the smaller number is $\chi$, then the greater number is ............... ( $\chi + 15$ or $15\chi$ or $15 - \chi$ or $\chi - 15$)
7. If Mahmoud has LE 15 and what Abu Zeid has is less than what Mahmoud has by $\chi$ pounds, then Abu zeid has ............... ( $\chi + 15$ or $15 - \chi$ or $15\chi$ or $\frac{15}{\chi}$)

8. If the side length of a rhombus is $\chi$, its perimeter is P, then the mathematic relation between $\chi$ and P is P = ............... ($4\chi$ or $\chi + 4$ or $\chi - 4$ or $4 - \chi$)

9. If the side length of an equilateral triangle is L and its perimeter P, then the mathematic relation between P and L is P = ...............
($L + 3$ or $\frac{1}{3}$ L or 3 L or $L - 3$)

10. Double the number $\chi$ subtracted 7 from it equals
($\chi - 7$ or $2\chi - 7$ or $7\chi + 2$ or $14\chi$)

**Third: Solve each of the following equations:**

1. $3\chi + 8 = 29$
2. $5\times - 7 = 33$
3. $\frac{1}{3}\chi + 8 = 10$
4. $\frac{1}{7}\chi - 3 = 2$

## The Third Unit: The measure

**First: Complete each of the following to get a correct statement:**

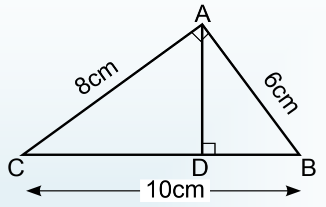
1. The circle whose diameter length is 14 cm, ($\pi = \frac{22}{7}$) it circumference = .........cm.
2. The area of the triangle whose base length is 12 cm and its height 5 cm = ............... $cm^2$.
3. The area of the rhombus whose side length = 10 cm and its height is 9.6 cm equals ............... $cm^2$.
4. The rhombus whose area is 36 $cm^2$ and the length of one of its diagonals is 8 cm, then the length of the other diagonal = ............... cm.
5. The square whose area is 24.5 $cm^2$, the length of its diagonal = ............... cm.
6. A rhombus has two diagonals of lengths 6 cm and 8 cm, then its area = ........$cm^2$
7. $\frac{\text{the circumference of the circle}}{\text{the length of its diameter}}$ = ...............
8. A rhombus of area 48 $cm^2$, its height = 4.8 cm, then its perimeter = ............ cm.
9. The length of the diagonal of the square whose area = 18 $cm^2$ is ............... cm.
10. The number of the altitudes of the parallelogram is ...............
11. The radius length of the circle whose circumfreence is 62.8 cm = ............... cm. ($\pi = 3.14$)
12. The length of the diagonal of a square is 12 cm, then its area = ............... $cm^2$.
13. The square whose perimeter is 16 cm, its area = ............... $cm^2$.
14. The square whose area is 72 $cm^2$, the length of its diagonal = ............... cm.

**Second: Choose the correct answer from those given between brackets:**

1. The area of the rhombus whose diagonals are of lengths 12 cm and 16 cm = ............... $cm^2$. (56 or 28 or 96 or 192)
2. The area of the triangle which the length of its base is 12 cm and its height = 5 cm is ............... $cm^2$. ( 30 or 60 or 17 or 34)
3. The square whose diagonal length = 8 cm, its area ............... $cm^2$. (64 or 32 or 16 or 8)
4. If the lengths of two adjacent sides in a parallelogram are 5 cm and 7 cm, its smaller height = 3 cm, then its area = ............... $cm^2$ (15 or 21 or 36 or 9)
5. The parallelogram whose area is 36 $cm^2$ and the length of a side of it = 9 cm, then the corresponding height to this side = ............... long (18 or 4 or 27 or 45)
6. The area of a rhombus is 30 $cm^2$ and the length of one of its diagonals 6 cm, then the length of the other diagonal is ............... cm. (4 or 6 or 8 or 10)
7. The perimeter of the square whose area is 25 $cm^2$ equals ............... cm. (100 or 50 or 20 or 25)
8. The length of the base of a triangle whose area is 240 $cm^2$ and its height = 10 cm is ............... cm (24 or 12 or 48 or 2400)
9. The circle whose perimeter is 32 cm, its area = ............... $cm^2$. (128 or 32 or 64 or 1024)
10. The circle whose the length of the greatest chords is 7 cm, its perimeter = ............... cm ($\pi$ = = $\frac{22}{7}$) ( 3.5 or 7 or 22 or 44)
11. The radius of the circle whose perimeter is 88 cm equals ............... cm (7 or 14 or 28 or 56)
12. The perimeter of a rectangle is 16 cm and its width is 3 cm, then its area = ............... $cm^2$. (15 or 39 or 48 or 24)
13. The area of the largest rectangle whose perimeter is 24 cm = ............... $cm^2$. (32 or 36 or 72 or 144)
14. The perimeter of a rhombus is 20 cm and its height is 6 cm, then its area = ............... $cm^2$. (30 or 120 or 24 or 26)
15. The base length of a triangle is 8 cm and its height is 5 cm, then its area = ............... $cm^2$. (9 or 40 or 8 or 20)

**Third:**

**1** **In the opposite figure:**




ABC is right-angled triangle at A

AB = 6 cm, AC = 8 cm, BC = 10 cm

$\overline{AD} \perp \overline{BC}$ Complete:

(A) The area of $\Delta$ ABC = $\frac{1}{2} \times 8 \times$ ..............

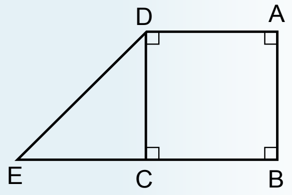
= .............. $cm^2$

(B) The area of $\Delta$ ABC = $\frac{1}{2} \times$ .............. $\times$ AD

= .............. $cm^2$

$\therefore$ AD = .............. cm

**2** **In the opposite figure:**

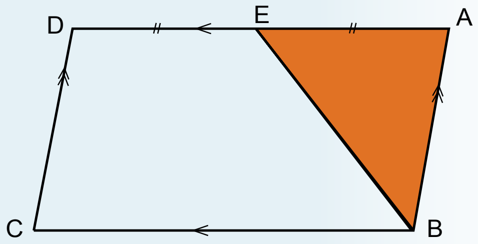



ABCD is a square, its perimeter

is 60 cm, E $\in \overrightarrow{BC}$, BE = 35

Find the area of the figure ABED

**3** **In the opposite figure:**




ABCD is a parallelogram in which

AD = 24 cm, E is the mid-point of $\overline{AD}$

The area of $\Delta$ ABE = 60 $cm^2$

Find:

(A) the area of the parallelogram ABCD

(B) The area of the figure E B C D.

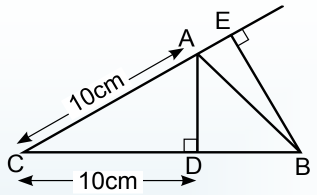
**4** **Which is greater in area:**

A rhombus in which the lengths of its diagonals are 6 cm and 8 cm or a square in which the diagonal length = 8 cm.

**5** **Which is greater in area:**

A square whose diagonal is 10 cm long or the right-angled triangle in which the lengths of the sides of the right angle are 8 cm and 15 cm.

**6** **In the opposite figure:**




$\Delta$ ABC, $\overline{AD} \perp \overline{BC}$ , $\overline{BE} \perp \overleftrightarrow{AC}$

BC = 20 cm, AC = 16 cm, AD = 8 cm

Find:

A) the area of $\Delta$ ABC

B) The length of $\overline{BE}$

**7** A rhombus in which the lengths of its diagonals are 12 cm, 16 cm and its height is 9.6 cm. Calculate:

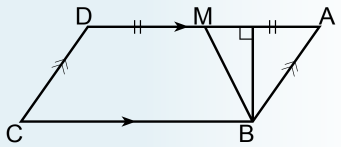
A) The area of the rhombus.

B) its side length.

C) its perimeter.

**8** If the length of the wheel a bicycle is 50 cm what is the distance covered by the bicycle in metre if it turns 1200 times ($\pi$ = 3.14)

**9** **In the opposite figure:**




ABCD is a parallelogram in which

BC = 14 cm

BE = 6 cm, M is the mid-point of $\overline{AD}$ Complete:

A) AD = ............... cm.

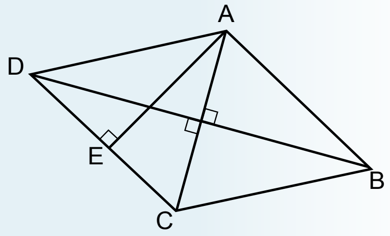
B) AM = ............... cm.

C) The area of ▱ ABCD = ............... $cm^2$.

D) The area of $\Delta$ ABM = ............... $cm^2$.

E) The area of the figure MBCD = ............... $cm^2$.

**10** **In the opposite figure:**




ABCD is a rhombus, its perimeter = 40 cm.

The lengths of its diagonals are 12 and 16 cm

Find:

A) The side length of the rhombus.

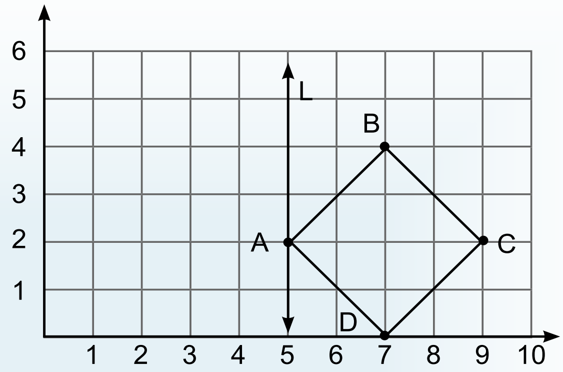
B) The area of of the rhombus.

C) The height of the rhombus.

**11** The area of a rectangle equals the area of a square which its diagonal = 12 cm long, Find the perimeter of the rectangle if its width = 8 cm long.

## The fourth Unit : The geometric transformations

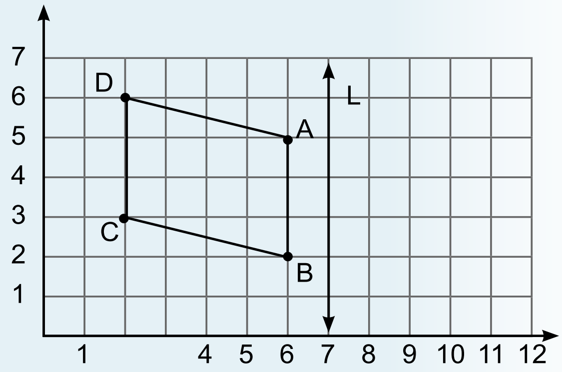
**1** In the cartesian Co. ordinates plane, from the following figure Find the image of the square by reflection on the straight line L wher A (5, 2), B (7, 4), C (9, 2), D (7, 0)




Then complete:

- (A) The image of A by reflection in the straight line L is ( ......... , ......... )
- (B) The image of B by reflection in the straight line L is ( ......... , ......... )
- (C) The image of C by reflection in the straight line L is ( ......... , ......... )
- (D) The image of D by reflection in the straight line L is ( ......... , ......... )

**2** In the cartesian Co. ordinates plane, from the following figure




First Complete

A ( ............... , ............... )

B ( ............... , ............... )

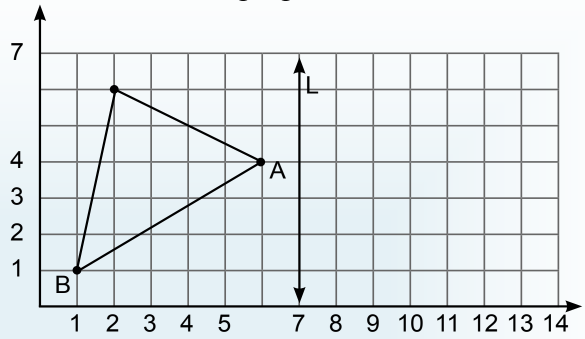
C ( ............... , ............... )

D ( ............... , ............... )

Second: If L is the axis of reflection of the figure ABCD, Find the image of the figure by reflection in the straight line L, then complete.

- (A) The image of A by reflection in the straight line L is A\` ( ............... , ............... )
- (B) The image of B by reflection in the straight line L is B\` ( ............... , ............... )
- (C) The image of C by reflection in the straight line L is C\` ( ............... , ............... )
- (D) The image of D by reflection in the straight line L is D\` ( ............... , ............... )

**3** In the cartesian Co. ordinates plane, from the following figure




**First:** Complete

A ( ............... , ............... )

B ( ............... , ............... )

C ( ............... , ............... )

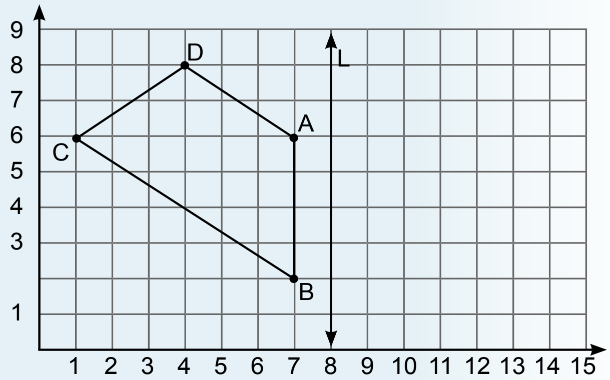
**Second:** If L is the axis of reflection of the figure ABC, Find the image of the figure by reflection in the straight line L, then complete.

A) The image of A by reflection in the straight line L is A` ( ............... , ............... )

The image of B by reflection in the straight line L is B` ( ............... , ............... )

C) The image of C by reflection in the straight line L is C` ( ............... , ............... )

**4** In the cartesian Co. ordinates plane, from the following figure




**First:** Complete

A ( ............... , ............... )

B ( ............... , ............... )

C ( ............... , ............... )

D ( ............... , ............... )

**Second:** If L is the axis of reflection of the figure ABCD, Find the image of the figure by reflection in the straight line L, then complete.

A) The image of A by reflection in the straight line L is A` ( ............... , ............... )

B) The image of B by reflection in the straight line L is B` ( ............... , ............... )

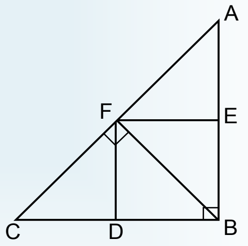
C) The image of C by reflection in the straight line L is C` ( ............... , ............... )

D) The image of D by reflection in the straight line L is D` ( ............... , ............... )

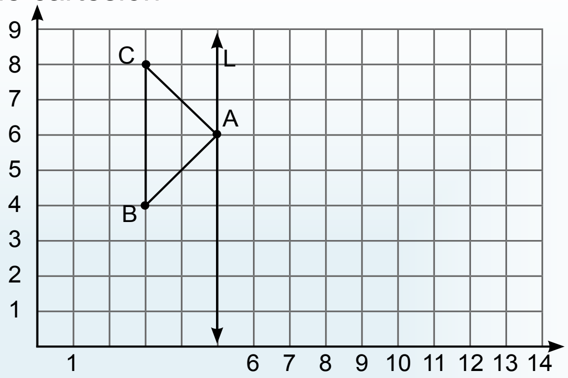
**In the opposite figure Complete:**

A) $\Delta$ BEF is the image of $\Delta$ AEF by reflection in $\overleftrightarrow{.....}$

B) $\Delta$ BDF is the image of $\Delta$ CDF by reflection in $\overleftrightarrow{.....}$



**6** **In the opposite figure,** it represents the cartesion Co-ordinates plane




(A) Determine the co-ordinates of the points A, B and C

(B) Draw Δ A\` B\` C\` the image of Δ ABC by reflection in the straight line L, then determine the co-ordinates of the vertices A\` B\` and C\`

(C) Draw Δ A\`\` B\`\` C\`\` the image of Δ ABC by reflection in the straight line M and determinen the co-ordinates of the vertices A\`\` B\`\` and C\`\`

**7** **In the cartesian co-ordinates**

(A) Determine the positions of the points A (8, 5), B (8, 2), C (5, 2), D (5, 7)

(B) Draw the line segments A B, A D, C D, B C

(C) If $\overleftrightarrow{CD}$ is the axis of reflection of the figure ABCD. Determine the image of the figure using the suitable symbols, then determine each of the ordered pairs which represent the vertices.

## The Fifth Unit: Statistics

**1** The following table shows the marks of a set of pupils in mathematics

| Sets | 10 – | 20 – | 30 – | 40 – | 50 – |
|---|---|---|---|---|---|
| frequency | 𝍸 | 𝍸 𝍸 | 𝍷𝍷 | 𝍸 𝍷𝍷𝍷 | 𝍸 𝍷𝍷 |

(A) Rewrite the previous table showing frequency in numbers.

(B) How many pupils get less than 30 marks ?

(C) Draw the frequency histogram and frequency polygon of this distribution.

**2** The following table shows the daily wages of workers in a company

| Sets | 20 – | 30 – | 40 – | 50 – | 60 – | Total |
|---|---|---|---|---|---|---|
| frequency | 8 | 10 | 16 | 12 | 4 | 50 |

Draw the frequency histogram and frequency polygon which represent these date.

**3** The following table shows the frequency distribution of the number of work hours of 50 workers

| Sets | 4 – | 6 – | 8 – | 10 – | total |
|---|---|---|---|---|---|
| frequency | 12 | 8 | 16 | 14 | 50 |

Draw the frequency histogram and frequency polygon which represent these date.

# The first test

**The First question:** Complete the following:

1. The set of even numbers (E) – The set of odd numbers (O) = ...............
2. The multiplicative neutral element in N is ...............
3. Shorouk saved $\chi$ pounds, her father gave her 10 pounds, then she has ............... pounds.
4. The sum of two numbers is 21 one of them is $\chi$ than the other = ...............
5. The side length of a square is 10 cm, then its area = ...............

**The Second question:** Choose the correct answer from these between brackets:

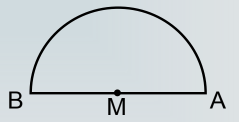
1. The set of even numbers ............... the set of natural numbers. ($\subset$ or $\in$ or $\not\subset$ or $\notin$)
2. If $\chi$ is an odd number, then $\chi$ + 3 is ............... number. (odd or even or prime)
3. twice the number $\chi$ subtracted 3 from it = ............... ($\chi$ – 3 or 2 $\chi$ + 3 or 2 $\chi$ – 3 or 3 – 2 $\chi$)
4. The base length of a triangle is 8 cm and its height is 5 cm, then its surface area = ............... (40 cm or 40 $cm^2$ or 20 $cm^2$)
5. The number of axes of symmetry of the rhombus equals ............... (zero or 1 or 2 or 4)

**The third question:**

1. Five even natural numbers, the greatest number is $\chi$ + 13, write down these numbers
2. Which is greater in area: A rhombus in which the lengths of its diagonals are 8 cm and 6 cm or the parallelogram in which the length of its base is 10 cm and the corresponding height is 5 cm, then calculate the difference between them.

**The fourth question:**

1. Zahraa saved 14 pounds, she bought 3 note books of $\chi$ pound for each. The remainder with her was 8 pounds. Express these situations by an equation.
2. Calculate the perimeter of the opposite figure where AM = 35 cm. ($\pi = \frac{22}{7}$)



**The fifth question:**

1. In the cartesian Co-ordinates plane determine the points. A (2, 2), B (5, 2), C (5, 8), D (2, 8) If $\overleftrightarrow{BC}$ is the axis of flection of the figure ABCD, then Determine the image of the figure ABCD

2. The following table shows the marks of 50 pupils in Exam of mathematics in one of months where the full mark is 50 marks.
Draw the frequency histogram and the frequency polygon which represent these date.

| Sets | 10 – | 20 – | 30 – | 40 – | total |
|---|---|---|---|---|---|
| frequency | 10 | 12 | 18 | 10 | 50 |

## The Second test

**The First question:** Choose the correct answer from those given:

1. (3 + 9) ............... N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
2. If $\chi$ (75 + 10) = 9 × 85, then $\chi$ = ............... number. ( 5 or 85 or 9 or 8 )
3. A rhombus in which the lengths of its diagenals are 10 cm and 12 cm, its area = ............... $cm^2$. ( 120 or 60 or 24 or 32 )
4. Twice the number 9 subtracted from it 4 the symbolic expression for this situation is ............... ( Y – 4 or 2Y – 4 or Y + 4 or 2Y + 4 )
5. If $\chi$ is an odd number, then $\chi$ + 2 is ............... number. ( even or odd or prime or other wise )

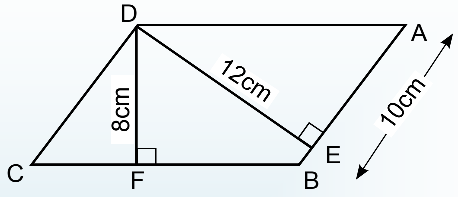
**The Second question:** Complete the following:

1. 32 + (59 + ...............) = (32 + 68) + ...............
2. The Number of axes of symmetry of the rhombus = ...............
3. The perimeter of the equilateral triangle whose side length is l cm = ...............
4. The area of the square = $\frac{1}{2}$ ...............
5. 1, 4, 8, 13, ........ in the same pattern.

**The third question:**

1. Which is greater in area. The triangle whose base length is 12 cm and height = 8 cm or the parallelogram in which the length of the base = 10 cm and its height = 5 cm.

**2** In the opposite figure ABCD is a parallelogram in which AB = 10 cm, DE = 12 cm, Df = 8 cm Find:




- **A** The area of the parallelogram ABCD
- **B** The length of $\overline{BC}$

### The fourth question:

**1** In the two dimensions cartesian co-ordinates Determine the points A (2, 5), B (5, 2), C (5, 8), then find the length of $\overline{BC}$ by measuring.

**2** Draw its image by reflection in $\overleftrightarrow{BC}$ and draw the figure ABC, How many of the axes of symmetry of it and what is area.

### The fifth question:

**1** Solve the following equations.

- **A** $\chi + 3 = 12, \chi \in N$
- **B** $2\chi + 9 = 21, \chi \in N$

**2** The following table shows the marks of 35 pupils in mathematics exam. in one of months where the full mark is 50. Draw the frequency curve which represents these date.

| Sets | 10 – | 20 – | 30 – | 40 – | total |
|---|---|---|---|---|---|
| frequency | 8 | 12 | 10 | 5 | 35 |

## The Third test

**The First question:** Choose the correct answer from those given:

**1** If $\chi + 8 = 15, \chi \in N$, then $\chi$ = ............... ( 3 or 7 or 6 or 5)

**2** The square whose diagonal length is 8 cm. its area = ............... $cm^2$.

( 64 or 32 or 16 or 8)

**3** If X = {$\chi$: $\chi \in N$ , $3 \leq \chi < 5$}, then X $\in$ ............... ( {4} or {3} or {3, 4} or {4, 5})

**4** If O is the set of odd number, then O ............... N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$)

**5** The triangle whose base length is 5 cm, and the corresponding height of it is 6 cm, its area = ............... $cm^2$. ( 30 or 15 or 25 or 36)

**The Second question:** Complete the following:

1. $64 + (36 + \text{..............}) = (64 + \text{..............}) + 35 = \text{..............} + 35 = \text{..............}$
2. The rhombus whose area is 36 $cm^2$ and the length of one of its diagonals is 8 cm, the length of the other diagonal = .............. cm.
3. The square whose area is 72 $cm^2$, the length of its diagonal = .............. cm.
4. 1, 4, 8, 13, .............. in the same pattern.
5. If $4 + \chi = 15$, then $\chi$ = ..............

**The third question:**

1. The length of the diameter of the wheel of a bicycle is 56 cm. Calculate the covered distance if the wheel turns one turn and what the number of turns to cover distance 352 metre (where $\pi = \frac{22}{7}$).
2. If the number $\chi$ exceeds twice the number (y) by 7. Write down the mathematical relation which relates $\chi$ by y.
3. If the age of a man now is $\chi$ years where $\chi \in N$ Find:

   A. The age of the man after 7 years. B. The age of the man since 10 years.

**The fourth question:**

1. using the properties of commutation, distribution and association Find the value of each of the following:

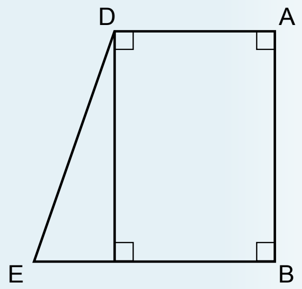
   A. $8 \times 137 \times 125$ = .............. B. $28 + 59 + 72$ = ..............

2. **In the opposite figure**

   ABCD is a rectangle of area 828 $cm^2$

   $E \in \overrightarrow{BC}$, AD = 23, BE = 35 cm.

   Find the area of $\Delta$ DCE




**The fifth question:**

1. The following table shows the marks of 40 pupils in Mathematics Exam.

   A. Find the value of A

   B. Draw the frequency histogram and the frequency polygon which represent these date.

| Sets | 10 – | 20 – | 30 – | 40 – | 50 – | Total |
|---|---|---|---|---|---|---|
| frequency | 5 | 7 | 12 | A | 7 | 40 |

**2** In the orthogonal cartesian-coordinates locate the points. A (8, 2), B (3, 2), C (3, 6) , D (8, 6) then complete:

A. The length of $\overline{AB}$ = ............... unit.  B. The length of $\overline{BC}$ = ............... unit.

C. The figure ABCD is ...............

D. The perimeter of the figure ABCD = ............... unit.

## The fourth test

**The First question:** Choose the correct answer from those between brackets:

**1** A parallelogram, in which, the lengths of two adjancent sides are 5 cm and 7 cm, the length of the smaller height = 4 cm, then its area = ............... $cm^2$.
(20 or 10 or 28 or 14 )

**2** twice the number $\chi$ subtracted 7 from it = ...............
($7 - \chi$ or $2\chi - 7$ or $7\chi + 2$ or $14\chi$ )

**3** If X = {$\chi$: $\chi \in$ N , $\chi \leq 3$}, then $\chi \in$ = ............. ({1, 2} or {0, 1} or {2} or {0, 1, 2})

**4** The next number in the pattern 1, 3, 9, 27, ............... ( 30 or 33 or 36 or 81)

**5** The length of the base of the triangle whose area is 120 $cm^2$ and its height is 5 cm = ............... cm. ( 12 or 48 or 24 or 6 )

**The Second question:** Complete the following:

**1** If $3\chi + 7 = 19$, $\chi \in$ N, then $\chi$ = ...............

**2** The circle whose diameter length is 14 cm, its circumference = ............... cm.
(where $\pi = \frac{22}{7}$)

**3** The set of prime numbers which are less than 17 is ...............

**4** The perimeter of a rectangle is 16 cm its width is 3 cm, then its area = .........$cm^2$

**5** 74 (73 + 27) = 74 × ............... = ...............

**The third question:**

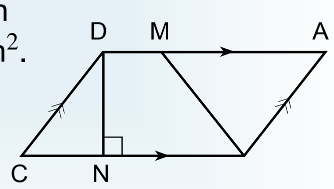
**1** Use the distribution property to find the value of.

A. 519 × 99 = ...............  B. 316 × 1001 = ...............

**2** In the opposite figure: ABCD is a parallelogram in which BC = 14 cm and the area of the parallelogram = 112 $cm^2$. M is the mid-point of $\overline{AD}$, Complete:

A. DN = ............... cm.

B. the area of Δ BAM = ............... $cm^2$.



(C) the area of the figure MBCD = ............... $cm^2$.

**The fourth question:**

1. In the cartesian co-ordinates plane locate the points A (5, 9), B (9, 7), C (5, 5), D (1, 7), E (9, 5)
2. Draw the line segments $\overline{AB}$, $\overline{AD}$, $\overline{CD}$, $\overline{BC}$
3. If $\overrightarrow{CE}$ is the axis of reflection of the figvure ABCD, then Determine its image then determine each of the ordered pairs which represent the vertices of the images
4. the figure ABCD ............... the area of the figure ABCD= ............... square units

**The fifth question:**

1. value each of the following equations.

   (A) $482 = \chi + (8 \times 10) + (4 \times 100)$

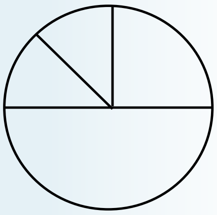
   (B) $\chi \times 3 + \chi \times 60 = 4 \times 63$

2. An employee spends his monthly salary as follow

   1000 pounds for food. 500 pounds for clothes

   250 the rent of the flat 250 other spending

   Represent there dada on the shown circular sectors



## The fifth test

**The First question:** Choose the correct answer from those given:

1. If X = {$\chi$: $\chi \in$ N, $2 \le \chi \le 3$}, then X = ............... ( {3, 2} or {3} or {2} or {∅} )
2. (49 ÷ 8) ............... N ( $\subset$ or $\in$ or $\not\subset$ or $\notin$ )
3. A rhombus of area 30 $cm^2$, the length of one of its diagonals is 6 cm, then the length of the other diagonal = ............... cm. ( 4 or 6 or 8 or 10 )
4. The diameter length of circle whose circumference = 88 equals ............... cm. ( 28 or 14 or 7 or 21 )
5. The length of the base of the triangle is 8 cm and its height is 5 cm, then its area = ............... $cm^2$. ( 9 or 40 or 8 or 20 )

**The Second question:** Complete the following:

1. The set of the natural numbers which are more than 4 and less than 5 is ..........
2. If we add 5 to three times of the number Y , then we get the number ...............
3. The perimeter of a rectangle is 16 cm, its width is $\chi$ cm, then its length = ..... cm
4. The square whose area is 18 $cm^2$, the length of its diagonal = ...............
5. If $945 = (\chi \times 100) + 45$, then $\chi$ = ...............

**The third question:**

1. Solve each of the following equation

   (A) $\frac{1}{3}\chi + 8 = 10$  (B) $\frac{1}{7}\chi - 3 = 2$

2. The area of a rectangle equals the area of a square whose diagonal length is 12 cm. Find the perimeter of the rectangle if its width equals 8 cm.

**The fourth question:**

1. If the length of the diameter of the wheel of a bicycle is 50 cm. How long is the distance covered by the bicycle in metre. if it turns 1200 turns. (where $\pi$ = 3.14).
2. In the orthogonal cartesian Co-ordinates.

   (A) Locate the points A (8, 5), B (8, 2), C (5, 7), D (5, 2)

   (B) If $\overrightarrow{CD}$ is the axis of reflection of the figure ABCD, Determine the image of the figure using the suitable symbols also determine each of the ordered pairs which represent the images of the vertices.

**The fifth question:**

The following table shows the frequency distribution of the number of work hours of 50 workers.

| Sets | 4 – | 6 – | 8 – | 10 – | total |
|---|---|---|---|---|---|
| frequency | 12 | 8 | 16 | 14 | 50 |

Draw the frequency polygon which represent these date.

## Exercises page (3)

**(1)** (a) ∈ (b) ⊂ (c) ∉ (d) ∉
(e) ⊂ (f) ⊂ (g) ⊂ (h) ∈

**(2)** (a) Zero (b) Number one
(c) {1, 2, 3, 4} (d) z

**(3)** (a) ✘ (b) ✓ (c) ✘ (d) ✘
(e) ✘ (f) ✓

## Exercises page (5)

**(1)** (a)✘
(b) ✘ (Note that the telephone number doesn't represent a natural number)
(c)✓ (d) ✘

**(2)** (a) x ∩ y = {2, 4}
(b) y ∩ z = {5}
(c) x ∪ y = {0, 1, 2, 3, 4, 5, 6, 9, 10}
(d) (x ∪ y) ∪ z = {0, 1, 2, 3, 4, 5, 6, 7, 9, 10}
(e) ( x ∩ y) ∩ z = ∅
(f) x - y = {0, 6, 10}

## Exercises page (15), (16), (17)

**(2)** (a) ∈ (b) ∈ (c) ∉
(d) ∈ (e) ∉ (f) ∈

**(3)** (a) zero, number one.
(b) x = 9 (c) zero (d) $\frac{\text{zero}}{9} = 0$
(e) 1613 × (13 - 3)
= 1613 × 10 = 16130
(f) N > M

**(4)** (a) an odd number
(b) an even number
(c) an even number
(d) an odd number
(e) an even number
(f) an even number

**(5)** (a) ✓ (b) ✘ (c) ✘
(d) ✘ (e) ✓

**(6)** (a) 3470 (b) 3200 (c) 2300
(d) 5700 (e) 6900

**(7)** (a) 26 (b) Zero (c) Zero
(d) 49 (e) 7

## Exercises page (19)

**(1)** (a) 3333, 33333, 333333.
(b) 16, 32, 64 (c) 13, 16, 19
(d) 19, 26, 34

**(2)** (a) 22, 27 (b) 81, 243
(c) 45, 55
(d) 77777, 777777

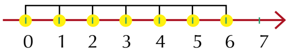
## General exercises page (21)

**(3)** (a) x + 8 year
(b) x - 15 year

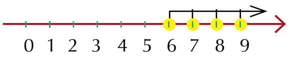
**(5)** (a) x < 8 (b) x > 8
(c) 8 < x (d) 8 > x
(e) Z ⩽ 9 (f) 9 ⩾ L
(g) 9 ⩽ L (h) 8 ⩾ Z <17
(i) 5 < x ⩾ 17

**(7)** (a) a < c (b) d < c (c) e > b
(d) e > c (e) c > a (f) d >a

**(8)** (a)




(b) y




**(10)** x + 6, x + 5, x + 4

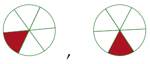
**(11)** y + 13, y + 11, y + 9, y + 7

**(12)** y - 2, y + 2

## Unite test page (24)

**(1)** (a) 75 (b) zero (c) 95

**(2)** (a) 32, 40 (b) 55, 40
(c)



## Exercises page (28), (29)

**(3)** (a) x + 8 (b) L - 3 (c) 10 - x

**(4)** (a) x − 5 (b) x + 10 (c) 2 x − 3
(d) y + 7

**(5)** (a) x - 8 (b) 3 y + 5 (c) $\frac{x}{2} + 4$
(d) $\frac{z}{3} - 7$

**(6)** (a) 4 L (b) 10 - x (c) 2 ( x + y)
(d) 10 - x

## Practice page (31)

(a) 18 LE (b) 48 LE (c) 63

## Practice page (32)

**(1)** The length of $\overline{AC}$ = L x
Perimeter of the triangle A B C = L + L + 5
= 2L + 5 cm

## Exercises page (33)

**(1)** (a) h = 3 L (b) h = 4x
(c) y = 20 - x (d) x = y +3

**(2)**

| x | 3 | 1 | 5 | 6 | 4 | 7 |
|---|---|---|---|---|---|---|
| y | 12 | 4 | 20 | 24 | 16 | 28 |

**(3)** x = 2 y + 9

**(4)** What he paid = 28 x + LE 5

## Exercises page (37)

**(2)** x + 5 = 12 , x = 7

**(3)** 2x = 20 , x = 10

**(4)** 5x = 15 , x = 3

## Exercises page (38)

**(1)** (a) x + 17 = 28 (b) y - 9 = 23
(c) 3 x - 5 = 16

**(3** (a) x = 9 (b) x = 4
(c) x = 32 (d) y = 12 (e) y = 35

**(4)** (a) x = 9 (b) x = 18
(c) x = 117 (d) x = 32
(e) x = 3 (f) x = 7

## Unit test page (42)

**(1)** (a) 2 x + 7 (b) 3y -3

**(2)** (a) 4 x (b) 3 L (c) 5 x

**(3)** (a) x = 2 (b) y = 12 (c) x = 8

## Practice page (46, 47)

**(2)** (a) $\frac{1}{2} \times 4 \times 6 = 12 \text{ cm}^2$
(b) $\frac{1}{2} \times 5 \times 7 = 17.5 \text{ cm}^2$
(c) $\frac{1}{2} \times 8 \times 11 = 44 \text{ cm}^2$
(d) $\frac{1}{2} \times 2 \times 10 = 10 \text{ cm}^2$
(e) $\frac{1}{2} \times 10 \times 6 = 30 \text{ cm}^2$
(f) $\frac{1}{2} \times 8.2 \times 2.2 = 9.02 \text{ cm}^2$
(g) $\frac{1}{2} \times 2.8 \times 4.2 = 17.22 \text{ cm}^2$

## Exercises page (48)

**(1)** (a) $20\text{cm}^2$
(b) $\frac{1}{2} \times 34 \times 15 = 255 \text{ cm}^2$
(c) $\frac{1}{2} \times 2 \times 4{,}8 = 4{,}8\text{cm}^2$

**(2)** The area of the triangle XAY = $\frac{1}{2} \times 4 \times 4$
= $8\text{cm}^2$
The area of the triangle XBC = $\frac{1}{2} \times 4 \times 8$
= $16\text{cm}^2$
The area of the triangle YDC = $\frac{1}{2} \times 4 \times 8$
= $16\text{cm}^2$
The area of the square ABCD = 8 × 8
= $64\text{cm}^2$
The area of the triangle XCY = 64 - (8 + 16 + 16)

## Exercises page (51), (52)

**(1)** c

**(3)** AD = 12cm
AM = 6cm
The area of the parallelogram
a b c d = 12 × 7 = 84 $\text{cm}^2$

# Answers

## Exercises page (54)

**(1)** The area of the square = $\frac{1}{2} \times 6 \times 6$

= $18cm^2$

## Exercises page (56)

**(2)**

| The length of a rhombus diagonal | The length of the other diagonal | The area of vhombus in square units |
|---|---|---|
| 3cm | 5.4cm | $8.1cm^2$ |
| 2.3cm | 4cm | $4.6cm^2$ |
| 24mm | 3cm | $360mm^2$ |
| 27cm | 6dm | $8.1dm^2$ |
| 1.7m | 400cm | $3.4m^2$ |

## Exercises page (60)

**(1)** 48.36cm

**(2)** 479.9cm, 448.4, 125.6

**(3)** 175.84cm, Two turns nearly.

**(4)** 21.98 cm

**(5)** 10cm, 69.08, 11cm

**(6)** Area of the parallelogram = $5.4 \times 4.1$

= $22.14cm^2$

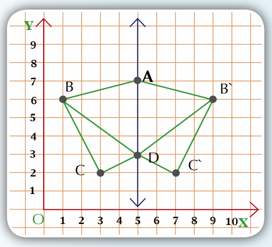
## Unit test page (62)

**(1)** $25cm^2$ , $36cm^2$ , $16cm^2$, $84cm^2$, $5cm^2$, $32cm^2$

## Practice page (74)

**First:** complete: A = (5, 7) B = (9, 6)

C = (7, 2) D = (5, 3)



**Second:**

(a) The image of B by reflection a cross L is B` (1, 6)

(a) The image of C by reflection a cross L is C` (3, 2)

The image of A by reflection a cross L is A (5, 7)

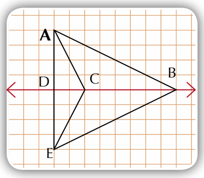
The image of D by reflection a cross L is D (5, 3)

**Third:** The image of the triangle b c d by reflection a cross L is the triangle b`c`d.

**Fourth:** The image of the figure ABCD by reflection a cross L is the figure A B`C` D

## General exercises page (75, 76)

**(3)**



(a) The image of the triangle ABC by reflection a cross $\overline{BD}$ is the Triangle EBC

∴ a b = e b, ac = e c

(b) The image of the triangle ACD by reflection a cross $\overline{BD}$ is the triangle ECD

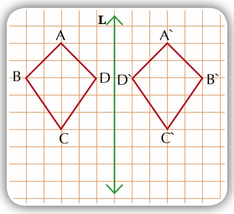
∴ ad = e d, $\overline{CD}$ coincides on itself

(c) The triangle ABC coincides the triangle EBC,

The triangle ECD coincides the triangle ACD

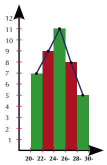
## Unit test page (82)

**(1)**



## General exercises page (90)

**(1)** 16 cities



**(2)** (a) 11 students

**(4)** Number of religious books = 200 books

Number of literary books = 200 books

Number of scientific books = 400 books

## Unit test page (92)

**(1) First**

| Set | -5 | -10 | -15 | -20 | -25 |
|---|---|---|---|---|---|
| Frequency | 5 | 10 | 17 | 7 | 2 |

**Second:** 15 students.

## Test (1)

**1** (A) ∈ (B) 2 (C) 24

**2** I: (A) 20 (B) associative

II: The triangle

**3** (A) 7 **4** (B) $60cm^2$ , 10cm

**5** I: (A) < (B) <

## Test (2)

**1** (A) diagonal × itself (B) ∈

(C) {1, 2, 3, 4}

**2** (A) 15 (B) ⊂ (C) 22

**3** (A) $40cm^2$

(B) 3X + 5 = 20, LE 5

**4** (A) area = $\frac{1}{2} \times 5 \times 5 - \frac{1}{2} \times 3 \times 3$

= $8\ cm^2$

(B) 7500

**5** (A) Perimeter = 390 cm

(B) $3850\ cm^2$

## Test (3)

**1** (A) 12 (B) $18\ cm^2$ (C) ∅

**2** I: (A) N X (B) 8cm

II: (A) square (B) 6

**3** I: (A) rectangle (B) $16\ cm^2$

**4** 128cm

## Test (4)

**1** (A) 1 (B) 5 (C) 100

**2** (A) 2 r (B) (2 , 5) (C) $10cm^2$

(D) $20\ cm^2$

**3** I: 36 cm

**4** (A) X = { 3, 4, 5, 6, 7}

(B) area △ = $24cm^2$

$24 = \frac{1}{2} \times 10 \times B D$

∴ B D = 4.8cm

(C) 3 X - 8 = 1

X = 3

**تم الطبع بمطابع الشروق الحـــيثة**
**بالمواصفات الفنية الآتية**

عـــد الصفحات بالغلاف: ١٢٨صفحة

المقاس: ٨٢ × ١١٤ سم

نـــوع الـــورق: لايقل الـــاخلى عن ٨٠ جرام والغلاف ٢٠٠ جرام

الـــوان الطبـــع: ٤ لون للـــاخلى و٤ لون للغلاف

**جميع حقوق الطبع محفوظة لوزارة التربية والتعليم داخل جمهورية مصر العربية**

الشروق
الحديثة للطباعة والتغليف
القاهرة: ٨ شارع سيبويه المصرى ـ ت:٢٤٠٢٣٣٩٩ ـ فاكس: ٢٤٠٣٧٥٦٧ (٠٢)
مدينة العبور ـ المنطقة الصناعية